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[54] **ASTRAGAL**
19 Claims, 12 Drawing Figs.

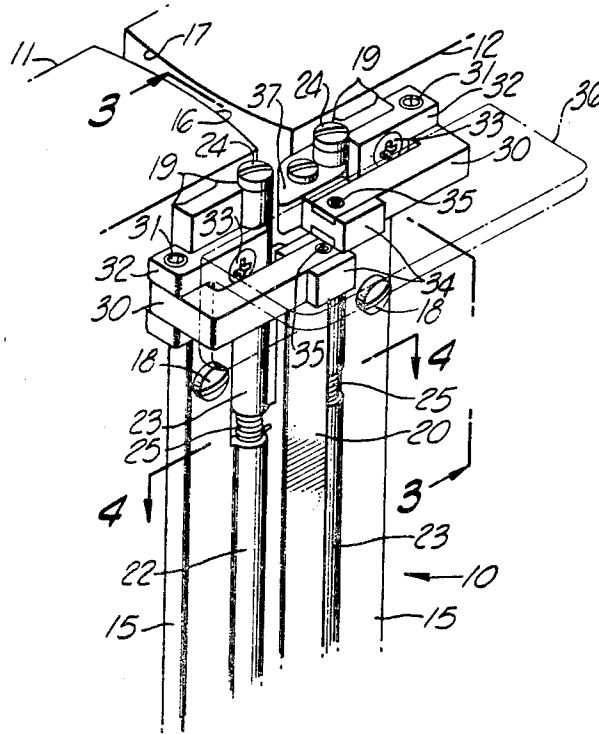
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 49/483

[51] Int. Cl. **E06b 7/16**

[50] Field of Search 49/483,
 366, 369, 368, 367; 160/206

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ABSTRACT: An astragal for covering the gap between the adjacent edges of a double door where a leaf member is pivotally mounted along that edge of each door and a cam pivots each leaf member from an open, protruding position to a mating position with the other leaf member in the final closing movement of the door and either door can be separately opened and closed.



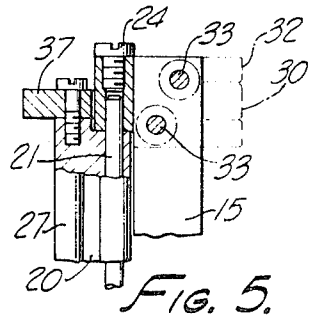
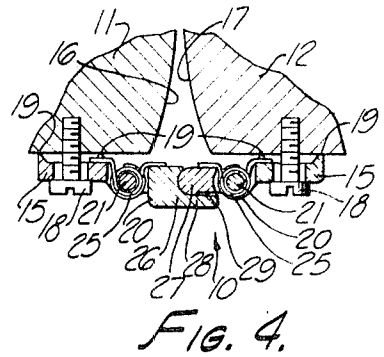
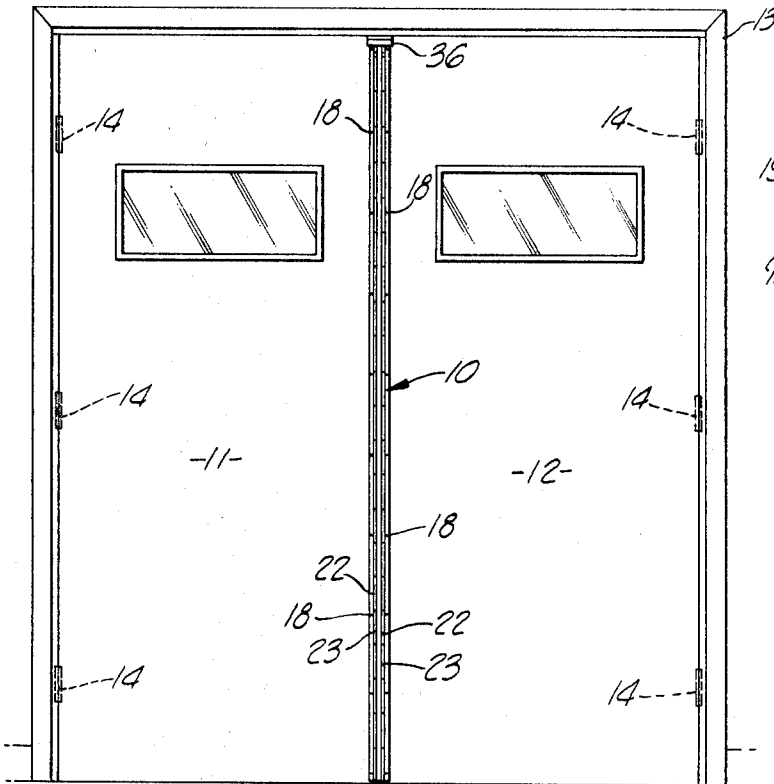


Fig. 1.

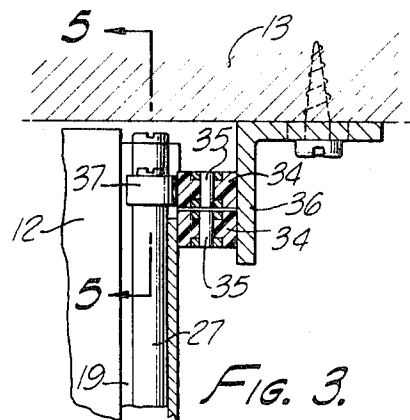
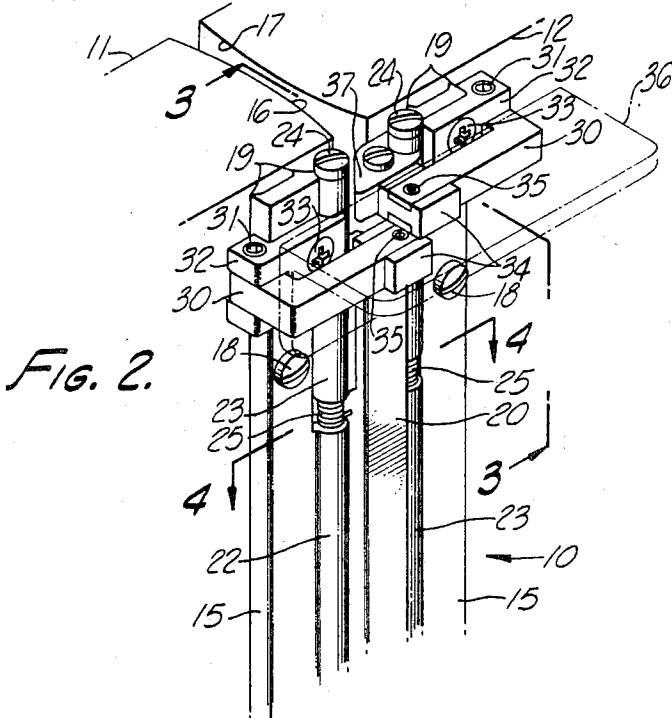


Fig. 2.

Fig. 3.

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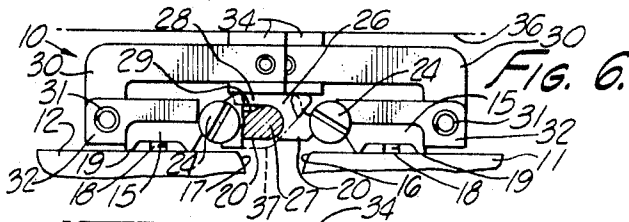


FIG. 6.

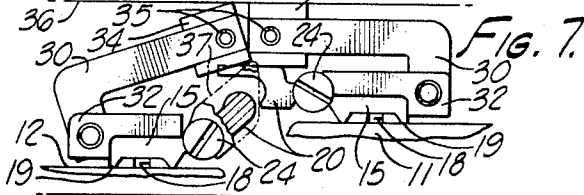


FIG. 7.

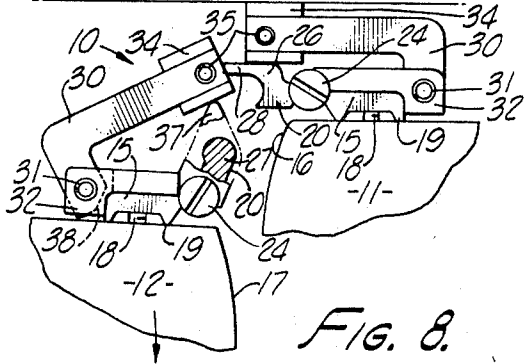


FIG. 8.

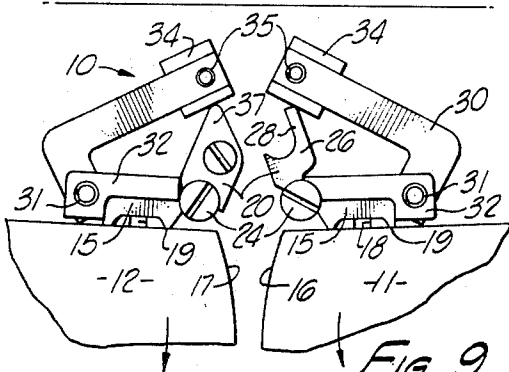


FIG. 9.

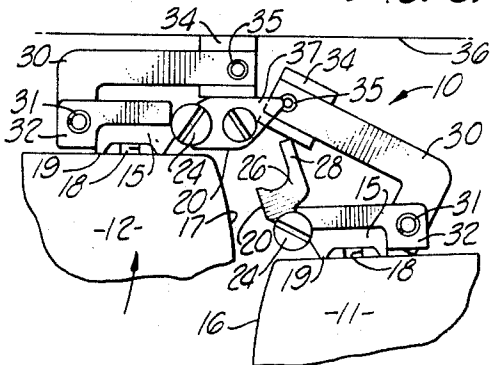


FIG. 10.

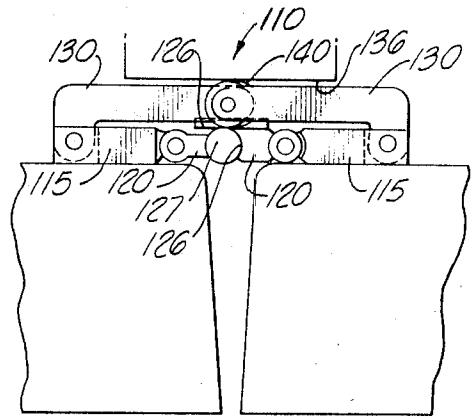


FIG. 11.

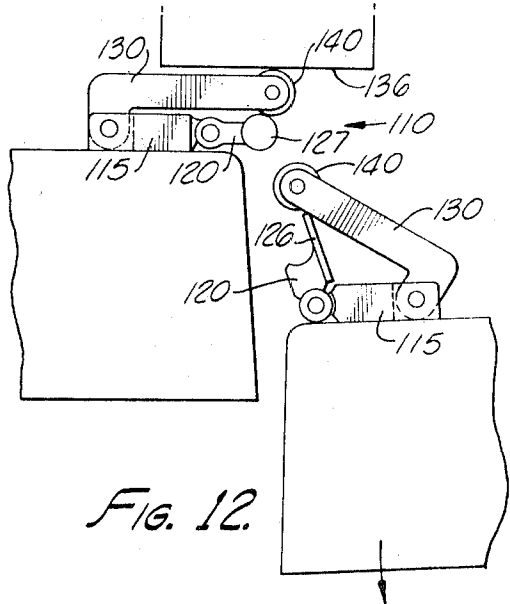


FIG. 12.

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ASTRAGAL

This invention relates to astragals for pivotally mounted closure members and, in particular, is directed to an astragal for double doors for allowing the opening of either door.

With double doors or windows that have their swinging edges adjacent each other, it is relatively common to provide a strip of molding or a flange mounted on one of the doors or windows to cover the gap between the adjacent edges for both weatherproofing and, in some instances, to prevent tampering with the latch between the doors or windows.

Since the conventional molding or flange extends from one door and overlaps the other, it is only possible to open one door in one direction without at least partially opening the other door. This often results in one door being latched in the closed position and only allowing access through the other door which is often undesirable. Further if the use of both doors is permitted then it is possible for the doors to close in the improper sequence where by the one door is prevented from closing by engagement with the flange or molding.

Moreover while the conventional flange or molding should form adequate weatherproofing proofing in the closed position it is relatively common for a gap to occur between the flange or molding and the door which it overlies either by reason of continued use or the spacing required for such an installation whereby the desired weatherproofing is ineffective. This condition often dictates the use of a resilient sealing element which may eventually become worn or damaged to an ineffective condition.

Summarizing, it is a principal object of this invention to provide a novel form of astragal for the swinging edge of a pivotable closure member wherein an elongated leaf member is adapted to be movably mounted on the swinging edge and actuated to move between retracted, open position when the closure member is open and a position extending across the gap to engage a mating member in relatively airtight relationship upon closing the closure member.

Another object of this invention is to provide a novel form of interlocking astragal for double doors wherein a pivotable leaf on each door edge is adapted to mate with the leaf on the other door edge and each leaf is separately pivoted in the initial opening and the final closing movements of that door to pivot between engaging and open positions.

Still another object of this invention is to provide a novel form of astragal for double doors and the like wherein elongated leaf portions are mounted on the swinging edge of each door and have interengaging nose portions forming a relatively airtight seal in the closed position of the doors and the pivoting movement of each leaf is caused by a cam member for allowing the separate opening and closing of either door without movement of the other door. A still further object is to provide such an arrangement wherein the interengaging portions of the leaves comprise mating concave and convex curves on the respective leaf members with an extending flange on the concave curved leaf to overlie the mating junction.

Other and more detailed objects and advantages of this invention will appear from the following description and the accompanying drawings, wherein:

FIG. 1 is an elevation view of a typical double door with the astragal of this invention installed thereon. FIG. 2 is a fragmentary perspective view of the upper portion of the astragal of this invention illustrating the components in the closed position of the door.

FIG. 3 is a fragmentary sectional elevation taken substantially on the line 3-3 of FIG. 2 at approximately the centerline between the doors.

FIG. 4 is a fragmentary sectional plan view of the astragal of this invention taken substantially on the line 4-4 in FIG. 2.

FIG. 5 is a fragmentary elevation view with portions shown in section taken substantially on the line 5-5 in FIG. 3.

FIGS. 6 through 10 are fragmentary plan views of the preferred astragal of this invention illustrating the progressive

positions of the components during the opening and closing of the doors. FIG. 6, 7 and 8 illustrate the door on the left being opened while the reverse progression of those FIGS. illustrate the closing of that door.

FIG. 11 is a fragmentary plan view of a modified form of the astragal of this invention with the doors closed and FIG. 12 illustrates the same embodiment with the door on the right pivoted to a partially opened position.

The invention is illustrated in connection with double doors as being the most advantageous use presently contemplated for the invention but it will readily appear to those skilled in the art that the invention may also be used on other closure members such as windows and on single as well as double closure members. For convenience of description the closure members will hereinafter be referred to as doors.

Referring more particularly to FIGS. 1 through 5, the astragal assembly, generally designated 10, of this invention is mounted on a pair of conventional doors 11 and 12 which are in turn pivotally supported in a frame 13 in the conventional manner. The hinges 14 for pivotally supporting the doors 11 and 12 are on the opposite sides of the doors from the mounting of a astragal assembly 10 whereby the doors 11 and 12 pivot only in the direction away from the side of the astragal assembly 10.

For a double door installation as illustrated, the astragal assembly 10 is comprised of a pair of similar, although not identical, halves with one-half for mounting on each of the doors 11 and 12. Each half of the astragal assembly includes a base member 15 extending substantially the entire height of the doors 11 and 12 at the swinging ends 16 and 17, respectively of the doors. The base members 15 are mounted on the doors 11 and 12 by a convenient means such as screws 18 spaced at appropriate intervals along the length of the base members. The side of each base 15 adapted to abut the surface of the door may be somewhat channel shaped having flanges 19 for engaging door and even becoming embedded in the relatively soft surface of some doors to prevent inadvertent movement of the base portions.

An elongated leaf member 20 is mounted on each of the base members 15 and extends the full height of the doors. The leaf members 20 are pivotally supported on the base members 15 by hinge pins 21 extending the length of the members and passing through alternate tubular sections 22 and 23 formed on the base members and leaf members, respectively. The hinge pins 21 are held in position by screws 24 threaded into the end of the tubular section at both the top and bottom of the astragal assembly. The proper length of the astragal assembly 10 to fit a particular door may be obtained conveniently by starting with overlength unit, cutting off the excess and rethreading the screws 24 in the ends to retain the hinge pins 21.

A torsion spring 25 is provided on each half of the astragal assembly and encircles the hinge pin 21 near the top portion of the assembly. The two ends of each torsion spring 25 engage the undersides of the base member and leaf member respectively and small slots may be formed in the members for receiving and retaining the torsion spring ends. The torsion springs are mounted to resiliently urge the leaf members 20 to protrude outwardly from the surface of the doors, that is, to an open position of the leaf members.

The leaf members 20 have nose portions 26 and 27 of a mating or interlocking configuration which is one essential difference between the two leaf members 20 in each astragal assembly 10. As shown the nose portion 26 is relatively J-shaped having a concave base portion and an extending flange 28. The nose portion 27 of the other leaf member is essentially round to fit the concave curve of nose portion 26 and has a relief portion 29 adjacent the flange 28. In the closed position of the doors 11 and 12 the leaf members 20 extend toward each other in a plane substantially parallel to the plane of the doors and the nose portions 26 and 27 interlock to form a relatively airtight seal as shown in FIG. 4.

Means are provided for causing the desired pivotal movement of the leaf members 20 upon the opening and closing of either of the doors and, as shown in the drawings, these means may include the cam arms 30 provided on each half of the astragal assembly 10 at the upper end of the assembly. The cam arms 30 are L-shaped in the plan view and have one end pivotally mounted by a pin 31 on a support block 32 which is in turn mounted on the base portion 15 by a pair of screws 33. In the preferred form of the astragal of this invention the other end of each cam arm 30 is provided with a cam follower block 34 of low friction material such as Nylon or Teflon. The cam follower block 34 extends beyond both sides of the cam arm 30 and may be conveniently mounted on the cam arm 30 by fitting into a slot on the end of the cam arm and being retained by a pin 35 passing through both the arm and the block. As best shown in FIGS. 2 and 3 the two cam arms 30 are vertically offset from each other to avoid interference therebetween in that the cam arms extend into overlapping relationship. The outer surface of the cam blocks 34 are adapted to engage a stationary stricker plate 36 which may be in the form of a short section of structural angle mounted on the door frame 13 as illustrated. The inner surface of one cam block 34 is adapted to engage the outer surface of the nose portion 26 along flange 28, while the inner surface of the other block 34 engages a cam 37 mounted on the upper end of the other leaf member 20 and overlying the nose portion 27. The thickness and the shape of the outer surface of cam 37 substantially simulates the shape of nose portion 26 and flange 28 of the other leaf member 20 whereby the movement of the respective leaf members 20 that is caused by the cam arms 30 and cam follower blocks 34 is substantially identical. It will readily appear to those skilled in the art that the stricker plate 36 and cam arms 30 may be provided at the bottom of the door if desired without changing the operation of the assembly.

Referring now more particularly to FIGS. 6 through 10, the sequential operation of the astragal assembly 10 of this invention will be described. In the closed position of the doors 11 and 12 shown in FIG. 6 the cam follower blocks 34 extend between the stricker plate 36 and the nose portion 26 and cam 37, respectively, of the two leaf members 20 to retain the leaf members in their closed and interlocking position extending directly toward each other in the same general plane as the doors. Since the leaf members 20 are biased outwardly (or upwardly as viewed in FIG. 6) by reason of the torsion springs 25, the leaf members 20 will remain in this position. As one of the doors is opened, for example door 12 as shown in FIG. 7, the leaf member 20 on the stationary door remains stationary while the leaf member 20 of the opening door pivots outwardly which in turn causes lateral movement away from the mating portion of the other leaf member 20. The pivotal movement is actually caused by the torsion spring 25 and is controlled by the cam follower block 34 to attain the proper movement of the leaf member out of interlocking engagement with the other leaf member. After the door has been opened a substantial amount as shown in FIG. 8, further pivotal movement of the leaf member 20 is arrested by interengagement between the cam 37 and the support block 32 whereby the leaf member protrudes at an angle slightly less than perpendicular to the plane of the door. Further outward pivotal movement of the cam arm 30 more than a short distance out of engagement with the leaf member 20 or cam 37 may be prevented by a properly shaped foot portion 38 on the cam arm adapted to engage a portion of either the base member 15 or the support block 32. The closing movement of one door, such as door 12, with the other door already in the closed position is illustrated by the reverse sequence through FIGS. 8, 7 and 6.

As shown in FIG. 9, when both doors 11 and 12 are open both of the leaf members 20 protrude outwardly from the doors at slightly less than a perpendicular angle with the support blocks 32 resisting further pivotal movement as urged by the torsion respectively 25. FIG. 10 illustrates the condition

where door 12 is closed and door 11 is open and it may be seen that as door 11 is closed from this position that the nose portion 26 of leaf member 20 will pivot around the now stationary nose portion 27 of the other leaf member to the condition where the flange portion 28 will overlie the nose portion 27 as previously described.

Referring now to the modified form of the astragal assembly of this invention illustrated in FIGS. 11 and 12 the basic components are again included and for convenience corresponding components are given the same number in the 100 series. Each half of the astragal assembly 110 has a base portion 115 adapted to be mounted on the surface of the respective doors and a leaf member 120 is pivotally mounted on each base member. Again one leaf member nose portion 126 is J-shaped while the other nose portion 127 is substantially round. A cam arm 130 is mounted on each base portion 115 and is somewhat L-shaped as previously described with respect to cam arms 30. In this embodiment the cam arms 130 carry rollers 140 rotatably mounted at their ends rather than the aforescribed cam follower block 34 of antifriction material. The rollers 140 are adapted to engage both the stricker plate 136 and the exterior surface of the respective leaf members 120 for causing the desired pivotal movement of the leaf members. Again the leaf members 120 are biased to protrude outwardly from the doors and are urged to their closed position upon closing of the doors. In all other respects the construction and operation of this embodiment of the invention is substantially the same as that described with respect to FIGS. 1 through 10.

It may be seen that by this invention a completely weather-proof and tamperproof astragal is provided without using resilient sealing means. Moreover the arrangement may be used on double closure members and permits the opening and closing of either door with movement of the other door.

I claim:

1. An astragal for a pivotally supported closure for sealably covering the gap along the swinging edge of the closure in the closed position, comprising: an elongated base for mounting on the closure at the swinging edge, an elongated leaf extending substantially the length of the swinging edge of the closure and mounted on said base for movement between a closed position extending beyond the edge of the closure to overlay the gap in the closed position of the closure and a nonextending open position, means urging said leaf toward said open position, elongated means for mounting adjacent the gap opposite the swinging edge and extending substantially the length of said leaf, interlocking nose portions on said elongated means and leaf for forming a relatively airtight seal in the closed position of said leaf and closure, and actuating means connected to said closure adapted to contact the stationary closure support for engaging and causing said movement of said leaf from the open position to the closed position during final closing movement of the closure.

2. The astragal of claim 1 wherein said elongated leaf is pivotally mounted on said base and protrudes outwardly from the plane of the closure in said open position.

3. The astragal of claim 2 wherein said means urging said leaf toward the open position comprises a torsion spring engaging said base and leaf for causing resilient pivoting.

4. The astragal of claim 1 wherein said interlocking nose portions comprise a J-shaped cross section on one member with the long portion comprising a flange extending laterally in the plane of the closure in the closed position, and a round cross section on the other member for matching the concave portion of the J-shaped cross section.

5. The astragal of claim 1 wherein said actuating means comprises a cam arm pivotally mounted on said base and has frictionless means for contacting the stationary closure support and engaging the leaf.

6. An astragal for a pivotally supported closure for sealably covering the gap along the closure swinging edge in the closed position, comprising: an elongated base for mounting on the closure at the swinging edge, an elongated leaf extending sub-

stantially the length of the closure swinging edge and pivotally mounted on said base for pivoting between a closed position extending laterally to overlay the gap in the closed position of the closure and an open position protruding outwardly from the plane of the closure, biasing means urging said leaf toward said open position, elongated means for mounting adjacent the gap opposite the swinging edge and extending substantially the length of said leaf, mating nose portions on said elongated means and leaf for forming a relatively airtight seal in the closed position of said leaf and closure, and cam means mounted on said base in a location adapted to engage a portion of the closure support and for engaging and pivoting said leaf from the open position to the closed position during final closing movement of the closure.

7. The astragal of claim 6 wherein said nose portions comprise a J-shaped cross section on one member with the long portion comprising a flange extending laterally in the plane of the closure in the closed position, and a round cross section on the other member for matching the concave portion of the J-shaped cross section.

8. The astragal of claim 6 wherein said cam means has a block element of low friction material for contacting the closure support and engaging the leaf for causing said movement.

9. The astragal of claim 6 wherein said cam means has a roller for both contacting the closure support and engaging the leaf for causing said movement.

10. In an astragal for covering the gap between the swinging edges of a pair of pivotably supported closure members, the combination of; a base for mounting on the swinging edge of each closure member, an elongated leaf member movably mounted on each said base for movement between positions overlying and not overlying the gap, said leaf member extending substantially the length of the swinging edge, means on each said base and leaf member for urging said leaf member toward said nonoverlying position, an actuating means mounted on each said base near an end of said leaf member and adapted to contact a portion of the closure support in the final closing movement of that closure member, each said actuating means engaging the said leaf member that is mounted on the same base for pivoting that leaf member from the said nonoverlying position to the position overlying the gap upon said contact with the closure support in the final closing movement of that closure member, and mating nose portions on the two said leaf members for forming a relatively airtight seal therebetween in said overlying position of both and allowing said movement of either leaf member upon opening movement of that closure member.

11. In an astragal for covering the gap between the swinging edges of a pair of pivotably supported closure members, the combination of; a base for mounting on the swinging edge of each closure member, an elongated leaf member pivotally mounted on each said base and adapted to extend the length of the swinging edge, biasing means mounted on each said base and leaf member for resiliently urging said leaf member to protrude outwardly from the plane of the closure member, a cam arm pivotally mounted on each said base near an end of said leaf member, a striker plate for mounting on the closure support in a position for engagement by each said cam arm, each said cam arm engaging said striker plate and the said leaf member that is mounted on the same base for pivoting that leaf member from the said protruding position to a closed position overlying the gap upon said engagement with the striker plate in the final closing movement of that closure

member, and mating nose portions on the two said leaf members for forming a relatively airtight seal therebetween in said closed position of both and allowing said pivotal movement of either leaf member upon opening movement of that closure member.

12. The astragal of claim 11 wherein each said cam arm has a block element mounted thereon of low friction material for engaging both said striker plate and said leaf member for causing said pivotal movement.

13. The astragal of claim 11 wherein each said cam arm has a roller mounted thereon for rolling engagement with said striker plate and leaf member for causing said pivotal movement.

14. The astragal of claim 11 wherein interengaging means are provided on each said base and leaf member for limiting the pivotal movement of the leaf member to protrude outwardly at an angle less than 90°.

15. In an astragal for covering the gap between the swinging edges of a pair of pivotally supported closure members, the combination of; a base for mounting on the swinging edge of each closure member, an elongated leaf member pivotally mounted on each said base and adapted to extend the length of the swinging edge, biasing means mounted on each said base and leaf member for resiliently urging said leaf member to protrude outwardly from the plane of the closure member, a cam arm pivotally mounted on each said base near an end of said leaf member, said cam arm and leaf member having parallel pivotal axes, said pivotal mounting of said cam arm on said base being more remote from said swinging edge of the closure member than the pivotal mounting of said leaf member on said base for said cam arm to pivot a smaller angle than the pivoting of said leaf member, a striker plate for mounting on the closure support in a position for engagement by each said cam arm, each said cam arm engaging said striker plate and the said leaf member that is mounted on the same base for pivoting that leaf member from the said protruding position to a closed position overlaying the gap upon said engagement with the striker plate in the final closing movement of that closure member, and mating nose portions on the two said leaf members for forming a relatively airtight seal therebetween in said closed position of both and allowing said pivotal movement of either leaf member upon opening movement of that closure member.

16. The astragal of claim 11 wherein said mating nose portions comprise a J-shaped cross section on one member with the long portion comprising a flange extending laterally in the plane of the closure in the closed position, and a round cross section on the other member for matching the concave portion of the J-shaped cross section.

17. The astragal of claim 16 wherein the interengagement between each cam arm and leaf member with the cam arm engaging the striker plate in the initial and final increments of open and closing movement of the closure member is such that the movement of each leaf member simulates a simultaneous pivoting about the curvature axis of the said round and concave portions of said leaf members and a lateral translation of said curvature axis away from the other leaf member.

18. The astragal of claim 1 wherein said elongated means is pivotally mounted for movement between a closed position overlaying the gap and nonextending open position.

19. The astragal of claim 4 wherein said flange of said J-shaped cross section is positioned between said round cross section and said actuating means in the closed position.