April 22, 1969 R. H. ELMORE 3,440,022

BLOW OUT CLOSURE CONSTRUCTION

Filed March 15, 1966 Sheet 1 of 2

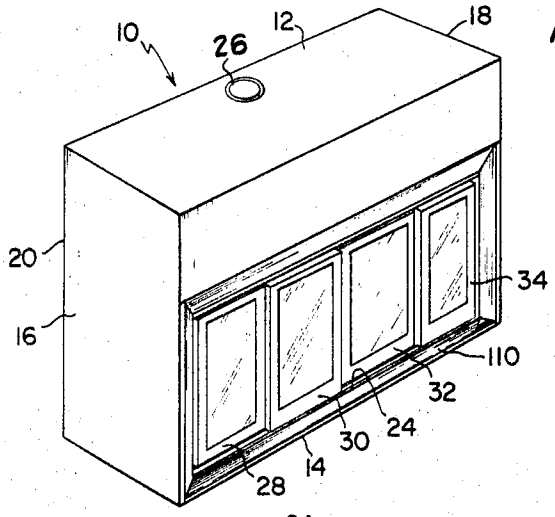


FIG. 1

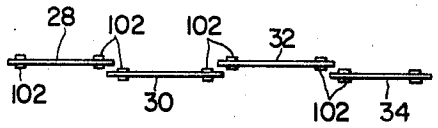


FIG. 2

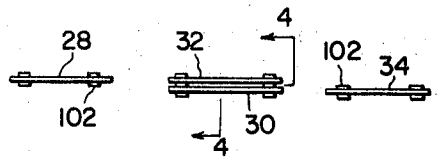


FIG. 3

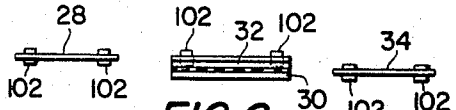


FIG. 6

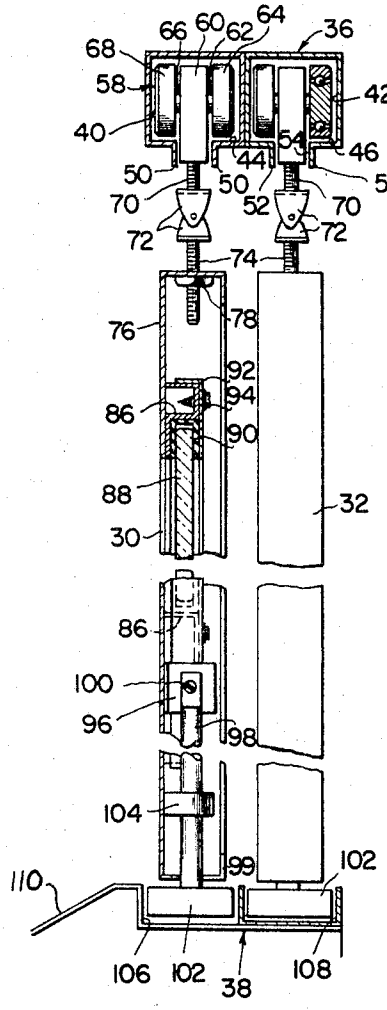
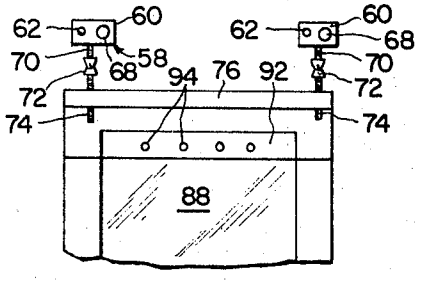


FIG. 4



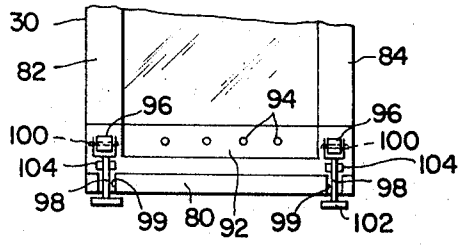


FIG. 5

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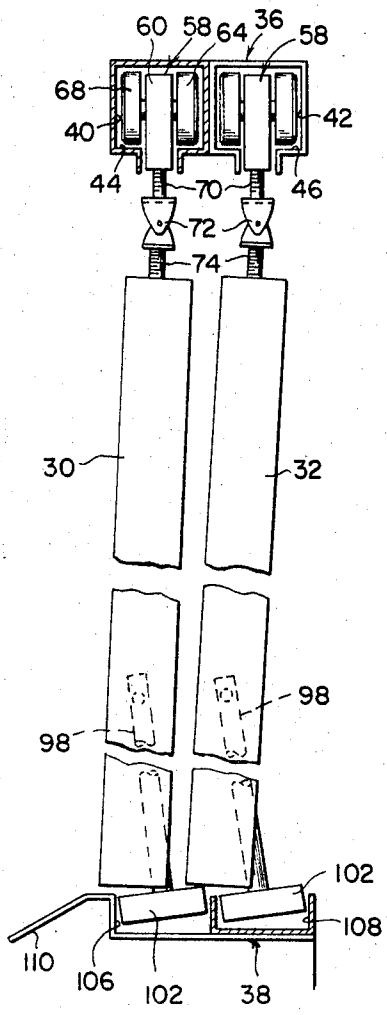


FIG. 7

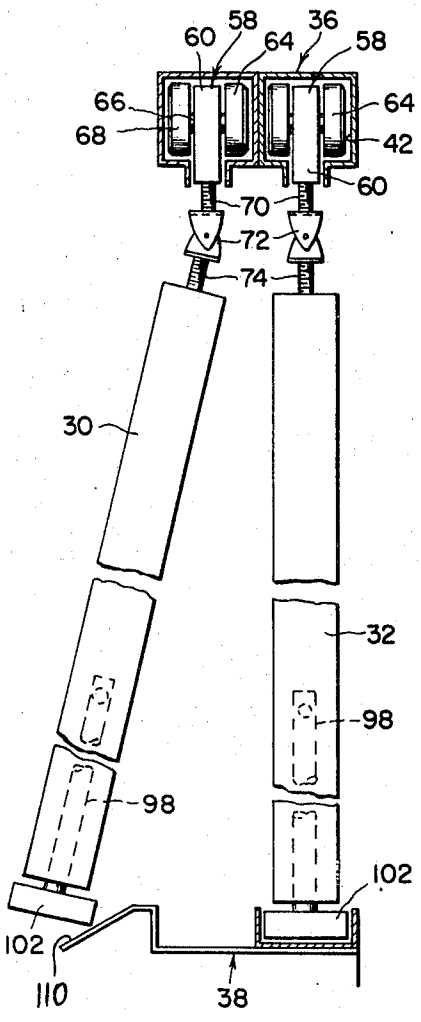


FIG. 8

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BLOW OUT CLOSURE CONSTRUCTION

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Int. Cl. B01l 1/00
U.S. Cl. 23—292 10 Claims

ABSTRACT OF THE DISCLOSURE

A closure construction for a fume hood including closure members that are mounted on the fume hood to pivot and swing out of closing relation with the fume hood entrance when an excessive pressure occurs in the fume hood.

This invention relates to a closure construction for a fume hood and, more particularly, pertains to a closure construction wherein the closure members are adapted to pivot relative to a fume hood in response to explosive forces spontaneously generated in the fume hood thereby to prevent harm to adjacent personnel and property.

Fume hoods are normally utilized in laboratory work to contain and exhaust odious, poisonous and/or corrosive fumes in addition to providing a means for removing the heat generated by chemical reactions and the like. The fume hood conventionally comprises a confined area which has a front opening or entrance to provide access to the work being performed. The opening is adapted to be closed by closure members such as safety sashes or doors which are constrained to slide in appropriately positioned tracks. However, a serious problem arises in the use of such fume hoods when the reaction undergoing experimentation is or is likely to become explosive in nature. The forces produced by such explosions usually shatter the closure members thereby causing damage to personnel and property in the vicinity of the fume hood.

Accordingly, a desideratum of the present invention is to provide a closure construction for fume hoods which utilizes closure members which are adapted to absorb some of the explosive forces generated therein.

Another object of the present invention is to provide a closure construction of the type disclosed which is compatible for use in existing fume hoods.

Still another object and feature of the present invention resides in the novel details of construction which provide a closure construction for a fume hood which allows the closure members, in one of their positions, to pivot outward relative to the fume hood in response to an explosion within the fume hood and, which in another of their positions, prevents the pivoting the closure members when they are in overlapping relation to each other, as when personnel are working with the fume hood, to prevent injury to such personnel.

Other and further objects of this invention reside in the structures and arrangements hereinafter more fully described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a fume hood utilizing a closure construction made in accordance with the present invention,

FIG. 2 is a top plan view of the sashes shown in FIG. 1, illustrating their relative staggered positions when they completely close the opening in the fume hood,

FIG. 3 is a top plan view of the closure members similar to FIG. 2, showing two of the closure members positioned one in front of the other to provide access to the interior of the fume hood,

FIG. 4 is a sectional view of the closure members taken along line 4—4 of FIG. 3, with parts broken away and to an enlarged scale,

FIG. 5 is a rear elevational view of a closure member shown in FIG. 4.

FIG. 6 is a top plan view of the closure members similar to FIG. 3, illustrating the closure members partially pivoted outward and interlocked,

FIG. 7 is a side elevational view of the closure members shown in FIG. 6, with parts broken away and to an enlarged scale, and

FIG. 8 is a side elevational view of at least two of the staggered closure members of FIG. 2 pivoted outward.

In the description of the present closure construction which follows, reference is made to a sash or door construction for so-called bench type fume hoods. However, the principles of the present invention are equally applicable to a fume hood of the step-in type wherein larger sashes or doors are utilized to close the opening of the fume hood. Accordingly, the present invention is not to be interpreted as being limited to an specific type of fume hood, but may find utility in fume hoods in general.

A fume hood which advantageously may be provided with a closure construction according to the present invention is illustrated in FIG. 1 and is designated generally by the numeral **10**. The fume hood **10** is of conventional construction and comprises the top fall **12**, a bottom wall **14**, opposed side walls **16** and **18**, a rear wall **20** and a front wall **22**. The front wall **22** is provided with an opening or entrance **24**. The entrance **24** is adapted to be closed by four safety sashes designated by the numerals **28**, **30**, **32** and **34**. In practice, the sashes **28–34** are substantially equal in size. The sashes are connected to the fume hood **10** so that the sashes **30** and **32** may be placed in face-to-face position with respect to each other and each respectively with their adjacent sashes **28** and **34**, as described in detail below. This limits the maximum extent that the fume hood can be opened to one-half the total width of the entrance **24**.

Received within the fume hood **10** may be a blower (not shown) which exhausts the fumes out of the fume hood through a duct system **26**, which disperses the fumes into the atmosphere at a point remote from the room in which the fume **10** is located. Normally, in fume hoods of the type described, the sashes are provided with glass so that the operator may observe the reactions that are occurring within the fume hood proper. However, in those cases where a spontaneous explosion has occurred within the fume hood, the explosive forces have caused the glass to shatter, thereby causing harm to personnel and property located in the vicinity of the fume hood or to the fume hood itself.

In order to obviate the abovementioned hazardous disadvantages, the closure construction of the present invention includes a longitudinally extending upper guide member **36** and a lower guide member **38** which are connected to the respective upper and lower edges of the entrance **24** in the front wall **22** of the fume hood **10** (FIG. 4). The upper guide member **36** includes a front track **40** and a co-extensive rear track **42** which are provided with respective bottom walls **44** and **46**. Provided on the bottom wall **44** and integral therewith are depending flanges **50** which define a central slot **48** therebetween. Similarly, provided on the bottom wall **46** of the track **42** are depending flanges **52** which define a central slot **54** therebetween. The respective tracks **40** and **42** are adapted to receive sash support members **58** to pivotally and slidably connect the respective sashes **28–34** to the fume hood **10**.

The support members **58** are identical in construction and one of the support members is shown in detail in

FIGS. 4 and 5. It is to be noted that two such support members **58** support each one of the sashes. For example, one support member **58** is connected to the sash **30** (FIG. 5) adjacent to the left hand edge of the sash and another support member **58** is connected to the sash **30** adjacent to the right-hand end of the sash. More particularly, the support members **58** associated with the sash **30**, include a block **60** which is received in the slot **48** and which extends above the bottom wall **44** of the track **40**. The block **60** is spaced from the flanges **50** so that the block is slidable within the slot **48**.

A shaft **62** is fixably received through one end of the block **60** and mounts a roller **64**. Another shaft **66** is fixedly received through the block **60** adjacent to the other end of the block and mounts a roller **68**. Threadedly received within the block **60** is a depending threaded shaft **70** which threadedly engages one end of a hinge **72**. Depending from the other end of the hinge **72** and threadedly engaged therewith is a threaded shaft **74** which extends through a top rail **76** of the sash **30** and which receives a nut **78** on the end thereof to connect the sash **30** with the support member **58**. Accordingly, the sash **30** may be adjusted with respect to the upper and lower guide members **36** and **38** by rotating the threaded shafts **70** and **74**. That is, when the shaft **70** and/or the shaft **74** is rotated in one direction, the sashes may be raised in the opening **24** whereas when the shaft **70** and/or the shaft **74** is rotated in the opposite direction, the sash will be lowered in the opening **24**.

It will now be obvious that the support members **58** shown in FIG. 5 pivotably and slidably mount the sash **30** on the fume hood **10**. In particular, the rollers **64** and **68** are adapted to engage and roll along the bottom wall **44** of the track **40** on each side of the slot **48** thereby connecting the sash **30** with the fume hood **10** for slidable movement in the entrance **24**. On the other hand, the hinge **72** provides a pivotal connection for the sash **30** which allows the sash **30** to pivot outwardly from the fume hood **10**. The sash **34** is connected to the front track **40** in a manner similar to the connection described above and the sashes **28** and **32** are connected to the rear track **42** in a like manner.

Since the sashes **28–34** are similar in construction, only the sash **30** will be described in detail, it being understood that the remaining sashes embody the same novel details and concepts of the present invention. Accordingly, the sash **30**, as shown in FIG. 5, comprises an upper rail **76** (noted above), a lower rail **80** and respective side stiles **82** and **84**. Extending rearwardly on the top rail **76** and the bottom rail **80** are mounts **86** which are spaced above the respective edges of the top and bottom rails. A safety glass **88** which is provided with a rubber channel **90** about its outer edges, is received against the mounts **86**. Glass retaining clamps **92** are positioned on the rear surface of the rubber channel **90** and they are connected to the respective mounts **86** by the screws **94** thereby to clamp the glass **88** between the clamps **92** and the respective upper and lower portions of the respective top rail **76** and the bottom rail **80**.

A feature of the present invention resides in the provision of interlock means which are connected to the respective sashes and which are releasably retained in the lower guide member **38**. The interlock means maintains the respective sashes in a vertical or closing position wherein the sashes are adapted to close portions of the entrance **24**. However, the interlock means are adapted to allow the sashes to pivot outwardly, under the conditions described in detail below, thereby to open the entrance **24**. Additionally, the interlock means are further adapted to prevent the pivoting of the sashes to the open position when a sash connected to the front track **40** is in overlapping or face-to-face relation with a sash connected to the rear track **42**, as when personnel are working at the hood. This prevents the sashes from pivoting or flying out and harming such personnel.

More particularly, the interlock means includes hangers **96** which are connected to the respective side stiles **82** and **84** and to which are pivotally connected depending guide rods **98** by means of pivot pins **100** which extend through appropriate apertures in the guide rods **98** and the hangers **96**. The guide rods **98** extend beyond the lower rail **80** and terminate in guide blocks **102** which are respectively received in the guide member **38**. Provided in the rail **80** are slots **99** which allow the rods **98** to pivot rearwardly of the sash **30**. Open-ended snap clips **104** are mounted on the stiles **82** and **84** below the hangers **96** and releasably receive the guide rods **98** therein to releasably retain the guide rods in a vertical position. It will now be obvious that the guide rods **98** may pivot rearwardly with respect to the sash **30** about the pivot pins **100** when the sash **30** pivots outwardly with respect to the fume hood **10** about the hinge **72**.

The lower guide member **38** comprises open topped front and rear channels **106** and **108** which underlie the respective front and rear tracks **40** and **42**. Connected to the top front edge of the channel **106** is an air foil **110** that extends forward and then tapers downwardly and outwardly. The guide blocks **102** associated with the sashes connected to the front track **40** are received in the front channel **106** whereas the guide blocks **102** associated with the sashes connected to the rear track **42** are received in the channel **108**. For example, as shown in FIG. 4, the guide blocks **102** associated with the sash **30** are received in the channel **106** and the guide blocks **102** associated with the sash **32** are received in the channel **108**. It is to be noted that the guide blocks **102** are greater in width than the respective sashes **28–34** for reasons which will become apparent from a consideration of the operation of the invention as described hereinbelow.

In operation, when it is desired to completely close the entrance **24**, the sashes **28–34** are slid along the respective tracks **40** and **42** so that the sashes will be staggered with respect to one another, as shown in FIG. 2 wherein each sash is adapted to close a different but adjacent portion of the entrance **24**. While FIG. 2 illustrates one arrangement of the sashes, it is to be noted that any one sash may be interchanged in position with another sash (i.e., the positions of the sashes **34** and **32** may be interchanged or the positions of the sashes **30** and **34** may be interchanged) it being necessary only that the sashes be staggered with respect to each other to close the entrance **24**. For this arrangement of the sashes, the sashes **28–34** will be oriented in the vertical or closing position with each of the guide rods **98** being received in a respective snap clip **104** and with each of the guide blocks **102** being received in its associated channel comprising the lower guide member **38**.

If an explosion occurs within the fume hood **10** when the sashes are in their staggered completely closing position of FIG. 2, the explosive force will be substantially equally distributed against the rear surfaces of each of the sashes thereby tending to push the sashes outwardly. Hence, the sashes **28–34** will pivot simultaneously outwardly about the hinges **72** to open the entrance **24** and allow the explosive forces to be dissipiated into the room in which the fume hood **10** is located, thereby preventing the shattering of the respective sashes.

For example, as the sash **30** pivots outwardly from the fume hood **10** about the hinge **72** to its guide blocks **102** will engage the front wall of the channel **106** and will be prevented from moving with and at the same speed as the sash **30**. However, continued outward movement of the sash **30** will cause the guide rods **98** to move out of the restraining snap clips **104** and pivot rearwardly with respect to the sash **30** to about the pivot pins **100**. The rods **98** will move rearwardly with respect to the sash **30** until the sash **30** has moved outwardly and upwardly a distance such that the guide blocks **102** clear the front wall of the channel **106**.

Similar movements will occur with respect to the sashes

28, 32 and 34. After the explosive forces have been dissipated, the sashes 28–34 will tend to fall and pivot back to their vertical or closing position under the influence of gravitational forces. However, the guide blocks 102, which normally extend below the respective sashes, will engage the air foil 110 (as shown in FIG. 8) to prevent the sashes from entering the fume hood on the back or return swing to further damage the apparatus therein.

As noted hereinabove, a feature of the present invention resides in the interlock means which prevents the pivoting of the sashes to their open position when personnel are actually working at the fume hood 10. It is to be noted that when an operator is working at the fume hood, two sashes such as 30 and 32 (FIG. 3) generally are moved to overlapping or face-to-face positions wherein the sash 30 is located in front of the sash 32. The operator then stands in front of the overlapping sashes 30 and 32 and extends his hands through the opening between these sashes and respective sashes 28 and 34 thereby to handle and manipulate the various retorts, curcibles and like articles within the fume hood 10.

If an explosion occurred at that time and if no safety features were provided, the sashes 30 and 32 would pivot about the hinges 72 and fly into the face of the operator. However, this action is prevented in the present invention. Accordingly, if an explosion occurs when the sashes 30 and 32 are positioned as shown in FIG. 3, the explosive force will be applied initially to the rear face of the sash 32 thereby causing the sash 32 to pivot outwardly first. As the sash 32 pivots outwardly, the guide blocks 102 associated therewith move into engagement with the front wall of the chanel 108 to cause the rods 98 connected to the sash 32 to pivot rearwardly with respect thereto. As seen in FIG. 7, as the sash 32 pivots outwardly it overlies the top surface of the guide blocks 102 associated with the sash 30. The force applied to the rear surface of the sash 32 is then transmitted to the front sash 30 through the sash 32. The sash 30 will then proceed to pivot outwardly and about the hinges 72 as described hereinabove. However, as the sash 30 begins to move outwardly, the guide blocks 102 associated therewith engage both the front wall of the channel 106 and lock beneath the bottom surface of the sash 32 and accordingly, they will be constrained within the channel 106.

Since the guide block 102 is rigidly connected to the sash 30 by means of the rod 98, the sash 30 will be prevented from further outward movement. Moreover, the sash 32 likewise will be blocked from further outward movement by the sash 30. Accordingly, the sashes 30 and 32 will remain in the closed position. Thus, the forces due to the explosion will be dissipated through the openings provided in the fume hood 10 between the overlapping sashes 30 and 32 and the remaining sashes 28 and 34.

If the explosive force was great enough, the sashes 38 and 34 would similarly pivot about their hinges 72, in the manner noted above, to further provide space through which the explosive forces can be dissipated. Furthermore, it is to be noted that the sashes do not necessarily have to be completely in overlapping position with respect to each other in order to prevent a sash from flying outwardly due to explosive forces within the frame hood. That is, it is sufficient for one of the rear sashes 28, 32 to overlie at least one of the guide blocks 102 of one of the front sashes 30 or 34 to prevent that particular front sash from moving upwardly and outwardly to cause harm to personnel.

Accordingly, a sash construction for a fume hood has been provided which is adapted to pivot with respect to the fume hood in response to explosive forces within the fume hood to allow such explosive forces to be dissipated without harming personnel or property in the vicinity of the fume hood. Additionally, safety means are provided to prevent such sashes from contacting personnel who are working at the fume hood at the time of such explosion.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

I claim:

1. A closure construction for a fume hood having an entrance in one wall thereof comprising at least one closure member for closing the fume hood entrance,
first means connecting said one closure member with the fume hood for sliding movement with respect to the entrance and for pivotal movement between a closing position wherein said one closure member is located within the fume hood entrance to close the entrance and an open position wherein said closure member is located outside the fume hood entrance to open the entrance,
and second means connected with said one closure member and the fume hood for maintaining said closure member in said closed position and for sliding movement with respect to the entrance.

2. A closure construction according to claim 1, in which said first means includes an upper guide member,
and connecting means connecting said one closure member with said upper guide member for pivotal and slidable movement with respect thereto.

3. A closure construction as in claim 2,
in which said connecting means comprises a block mounting a pair of rollers,
said pair of rollers being in rolling engagement with said upper guide means,
hinge means,
and means for connecting said hinge means intermediate said one closure member and said block to provide for the pivotal movement of said one closure member relative to said entrance.

4. A closure construction according to claim 1,
in which said second means includes a lower guide member adapted to be connected to the bottom edge of the entrance,
and interlock means connected to said closure member and releasably received in said lower guide member to releasably retain said one closure member in said closed position.

5. A closure construction for a fume hood as in claim 4,
in which said lower guide member includes a channel having an open top,
said interlock means comprising a rod pivotably connected to said one closure member,
and a guide block connected to the end of said rod and received through the open top of said channel,
whereby pivoting of said one closure member toward the open position causes pivoting of said rod relative to said one closure member to lift said guide block out of said channel to provide for the further movement of said one closure member to the open position.

6. A closure construction or a fume hood according to claim 1,
wherein said one closure member closes a first portion of the entrance of said fume hood,
a second closure member for closing a second portion of the entrance,
third means connecting said second closure member with said fume hood for pivotal movement between a closing position wherein said second closure member is located within the confines of the fume hood

entrance to close the second portion of the fume hood entrance and an open position wherein said second closure member is located outside of the fume hood entrance to open the fume hood entrance,

and fourth means connected to said second closure member and releasably connected to the fume hood for maintaining said second closure member in said closed position,

and means on said second closure member adapted to engage said second means on said one closure member when said second closure member begins to move toward said open position to prevent release of said second means from the fume hood, whereby said one closure member and said second closure member are maintained in the closed position.

7. A closure construction according to claim **6**,

in which said first means includes a top front track,

and connecting means for connecting said one closure member with said front track for pivotal and slidable movement with respect thereto,

said third means including a top rear track co-extensive with said front track,

and means for connecting said top rear track with said second closure member for pivotal and slidable movement with respect thereto.

8. A closure construction for a fume hood as in claim **6**,

in which said second means includes an open-topped front channel connected to the bottom of the entrance,

and interlock means connected to said one closure member and releasably received in said front channel;

said fourth means including a rear channel co-extensive with said front channel,

and lock means pivotally connected to said second closure member and releasably received in said rear channel, whereby said one closure member and said second closure member may be positioned in overlapping relationship with each other,

said means for engaging said second means comprising the lower edge of said second closure member when said one closure member and said second closure member are in an overlapping position.

9. In a fume hood having an opening,

a first door slidable on said fume hood to close and open a respective portion of the opening,

guide means along a defining wall of the opening,

channel means along a defining wall of said opening opposite said guide means,

means on said first door cooperable with said guide means to guide the first door for sliding movement to close and open the respective portion of the opening and being operable to enable said first door to swing out of the opening, and interlock means on said first door cooperable with said channel means during the sliding of said first door to retain the first door in the opening and operable to move out of cooperation with said channel means when a force is applied to said first door to enable said first door to swing out of the opening.

10. In a fume hood as in claim **9**,

a second door slidable on said fume hood to close and open a second portion of the opening and being adapted to be moved into overlapping relation with said first door, mounting means on said second door cooperable with said guide means to guide said second door for sliding movement to close and open the second portion of the opening and being operable to enable said second door to swing out of the opening,

and interlock means on said second door cooperable with said channel means during the sliding of said second door to retain the second door in the opening and operable to move out of cooperation with said channel means when a force is applied to said second door to enable said second door to swing out of the opening,

the interlock means on said first door lockingly engaging with said second door when the force is applied and said first and second doors are in overlapping relationship.

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JAMES H. TAYMAN, *Primary Examiner.*

U.S. Cl. X.R.

49—141; 98—115; 110—173