Feb. 20, 1940. M. McG. SWEPSTON 2,190,892

SAFETY DEVICE FOR FURNACES

Filed March 31, 1939

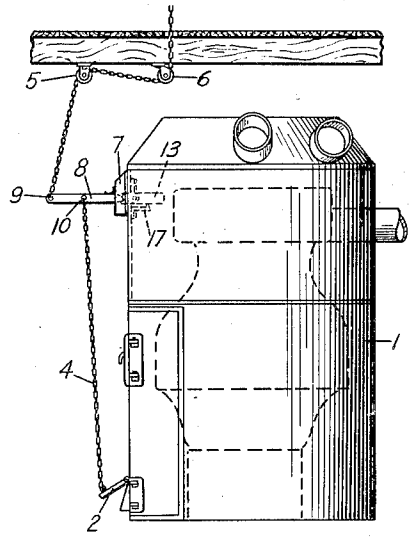


Fig. 1

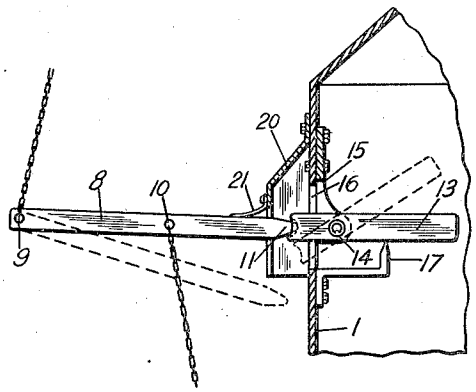


Fig. 2

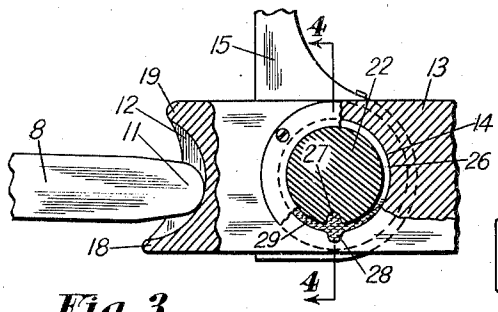


Fig. 3

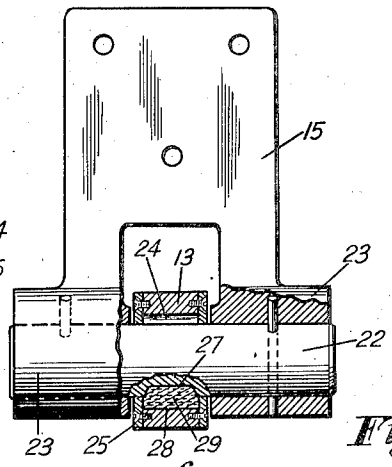


Fig. 4

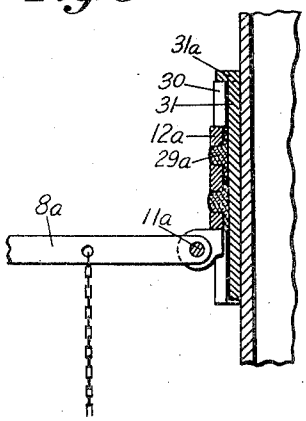


Fig. 6

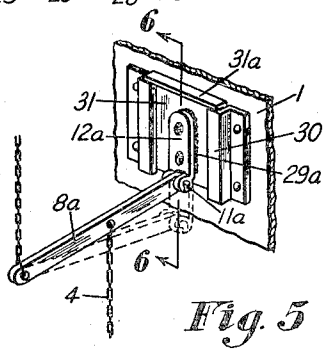


Fig. 5

INVENTOR
Murray McGee Swepston
BY Corbett & Mahoney
ATTORNEYS

Patented Feb. 20, 1940

2,190,892

UNITED STATES PATENT OFFICE

2,190,892

SAFETY DEVICE FOR FURNACES

Murray McGee Swepston, Columbus, Ohio

Application March 31, 1939, Serial No. 265,294

10 Claims. (Cl. 126—287.5)

My invention relates to a safety device for furnaces. It has to do, more particularly, with a safety device for automatically closing the draft door of a hot air furnace when it becomes over-heated, although it is not necessarily limited thereto.

In many instances hot air furnaces become over-heated because of failure through negligence or forgetfulness to close the draft door of the furnace after the fire has had a sufficient start. Although automatic draft controls, which embody a thermostat and electric motor, overcome this danger to a certain extent, they are not completely reliable because if the electric current goes off, they will not function. Thus, the draft might be open when the current goes off and will not be closed causing overheating of the furnace. Furthermore, these electrically operated controls are quite expensive so that most hot air furnaces are not equipped with them. Several attempts have been made to provide a safety device for hot air furnaces which would close the draft door in case the furnace becomes over-heated. However, these prior art devices have not been very practical. Most of them have been of a complicated structure and expensive to manufacture. Also they do not function positively and efficiently and are not foolproof.

One of the objects of my invention is to provide a safety device for hot air furnaces which is of such a nature that it will function positively and efficiently whenever the furnace becomes over-heated to close the draft door of the furnace.

Another object of my invention is to provide a device of the type described which is of such a nature that there will be no danger of the parts binding and thereby rendering the device inoperative and which is of such a nature that it is entirely foolproof.

Another object of my invention is to provide a device of the type indicated which is of a very simple structure and which can, therefore, be manufactured and sold at a low cost.

In its preferred form, my invention is adapted to be applied to the usual chain controlled draft door. It embodies means which is associated with the operating chain and which will operate when the furnace over-heats to, in effect, lengthen the chain and allow the draft door to drop into closed position.

The preferred embodiment of my invention is illustrated in the accompanying drawing wherein similar characters of reference designate corresponding parts and wherein;

Figure 1 is a side elevational view of a hot air furnace having my safety device applied thereto.

Figure 2 is a detail mainly in side elevation but partly in section of my safety device.

Figure 3 is a detail mainly in side elevation but partly in section showing a portion of my safety device.

Figure 4 is a view taken substantially along line 4—4 of Figure 3.

Figure 5 is a perspective view of a modified form of my device.

Figure 6 is a vertical sectional view taken substantially along line 6—6 of Figure 5.

With reference to the drawing, and particularly to Figures 1 to 4, I have illustrated my device applied to the usual type of hot air furnace embodying an outer casing 1. This furnace includes the usual draft door 2 pivoted at its upper edge so that it always tends to drop into closed position. A chain 4 has its lower end connected to the draft door 2 and it passes upwardly around pulleys 5 and 6 to suitable regulating means which may be of the usual type either manually or automatically operated. Of course, a different arrangement of pulleys may be provided depending upon the relative rotation of the furnace and the regulating means.

My safety device is indicated generally by the numeral 7 in Figure 1. It comprises a lever 8 in the form of a metal bar. The outer end of the lever 8 has the lower end of the upper section of the chain connected thereto as at 9. The upper end of the lower section of the chain 4 is connected to the member 8 intermediate its ends as at 10. The inner end of the bar 8 is tapered and rounded as indicated at 11 in Figure 3. This inner end extends into a curved groove or socket 12 formed in the outer end of member 13. The member 13 is pivoted as at 14 within the casing 1 of the furnace. This pivot construction is carried by a bracket 15 secured to the interior of the casing. The outer portion of member 13 extends through a slot 16 in the casing 1. This member 13 is so pivoted that its inner portion is longer and heavier and, therefore, the inner end of member 13 will tend to swing downwardly. However, an upstanding stop 17 secured to the interior of the casing 1 normally prevents this downward swinging.

It will be noted that the pulley 5 (Figure 1) is disposed behind the outer end of the member 8. This will cause the upper section of the chain 4 to exert a pull on the member 8 which will tend to keep its inner end in the socket 12. It

will also be noted that the point of connection of the lower section of the chain 4 to the draft door 2 is spaced inwardly closer towards the furnace than the point of connection 10 to the member 8. This also exerts an inward pull on the member 8 which tends to keep it in the socket 12. It will be noted that the socket 12 is so formed that a tongue 18 is formed at its lower edge which is longer than the similar tongue 19 at its upper edge. Since the weight of the draft door normally pulls downwardly on the inner end of member 8, it is desirable to have the portion 18 longer than the portion 19. A housing 20 is provided on the exterior of the casing 1 and a slot is provided in the outer wall thereof through which the member 8 projects. A flat spring 21 secured to the housing bears against the upper edge of member 8 and aids in keeping it in the socket 12.

It will be noted that the pivot point 14 of member 13 is located adjacent to the top of the furnace which will be the hottest point. This pivot structure is such that normally the member 13 will be prevented from moving about the pivot point 14. The draft door 2 can be opened and closed under normal conditions in the usual way. By pulling upwardly on the chain 4, the draft door will be opened and during this operation the member 8 will merely pivot about the point where it contacts with the bottom of the socket 12. The draft door can be closed merely by lowering the chain and member 8 will again pivot in the manner described.

The pivot 14, however, is of such construction that when the furnace becomes over-heated, the weight of member 8 will cause the inner end of member 13 to swing upwardly and its outer end to swing downwardly permitting the inner end of member 8 to drop out of the socket 12, as indicated by the dotted lines in Figure 2. This pivot construction is illustrated best in Figures 3 and 4. It comprises a pin 22 extending transversely of the bracket 15 and keyed in sleeve portions 23 formed on said bracket. The member 13 is disposed between the sleeve portions 23 and the pin 22 freely passes through an opening 24 formed therein. At each side of the opening 24 there is provided a collar 25 which fits tightly around the pin 22. It will be noted from Figure 3 that an annular space 26 is formed between the pin 22 and the wall of opening 24 in member 13. The pin 22 is provided with a notch 27 and the wall of the opening 24 is provided with a notch 28. The space 26 and the notches 27 and 28 receive a low melting point metal 29. This metal 29 is supplied to the space 26 when in liquid form. When it solidifies, it locks the pin 22 and the member 13 together, preventing swinging of member 13 about its pivot point. However, the metal is of such a nature that when the temperature of the furnace exceeds a predetermined degree, which would be when the furnace is over-heated, the metal 29 would melt permitting swinging of member 13 about its pivot point 14.

It will be apparent that the member 8 will normally be in a horizontal position as indicated in Figure 1. However, as soon as the furnace overheats, the metal 29 will melt, the member 13 will rotate about pivot 14 in such a manner that its outer end will swing downwardly, and the member 8 will drop out of the socket 12. If the draft door 2 is open at this time, it will drop into closed position because the member 8 will fall into a position in alignment with the chain 4 serving, in effect, to increase the length of the chain. The safety device may be reset merely by returning member 8 to its original position. The member 13 will automatically drop back to its original position and when the metal 29 cools sufficiently, it will harden again locking member 13 in position. It will be apparent that with this structure, after the device is operated it will not be necessary to replace any parts.

In Figures 5 and 6 I show a modified form of my safety device. In this form I provide a lever 8a substantially the same as the lever 8 with the exception that its inner end is pivoted at 11a to a member 12a. The member 12a is flat and is secured to a flat plate 31. In positioning it, it is adapted to be slid downwardly between two guide members 30 which are secured to the outer surface of the casing 1 adjacent the top of the furnace. The member 31 has a lip 31a at its upper end which cooperates with the upper ends of members 30 to limit downward movement of member 31. The member 8a is connected to the chain 4 exactly as before. The members 31 and 12a are joined together by low-melting point metal 29a disposed between these two members and extending into openings formed in member 12a.

In the operation of this form of my device, when the furnace becomes over-heated, the metal 29a will melt permitting the members 12a and 31 to separate and permitting lever 8a to drop downwardly, increasing the length of the chain and allowing the draft door to drop into closed position. To again reset the device, it is necessary to replace the unit consisting of member 12a and 31 with a new unit.

It will be apparent from the above description that I have provided a device for controlling the draft door of the furnace which has many advantageous features. It will always function positively and efficiently whenever the furnace becomes over-heated to close the draft door of the furnace. It is of such a nature that there will be no danger of the parts binding. It is entirely fool-proof. Furthermore, although it has all of these and additional advantages, it is of simple structure and can be manufactured and sold at a low price.

Various other advantages will be apparent from the drawing, the preceding description and the following claims.

Having thus described my invention, what I claim is:

1. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door, and means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a member interposed in said flexible member and always remaining connected thereto, said member normally occupying a position where it is substantially at right angles to said flexible member but being movable to a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree.

2. In a furnace having a draft door which normally tends to close, an operating member extending from said door to a point from which the door is to be operated, and means for increasing the effective length of said operating member to permit the door to drop into closed position when the temperature of said furnace exceeds a pre-

determined degree, said means comprising a member connected to said operating member, said member being movable from a position where it is substantially at right angles to said operating member to a position where it is substantially in alignment with said operating member when the temperature of the furnace exceeds said predetermined degree.

3. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door, means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a member interposed in said flexible member and always remaining connected thereto, said member normally occupying a position where it is substantially at right angles to said flexible member but being movable into a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree, and means for controlling the position of said last-named member, said means comprising metal which will melt at a comparatively low temperature.

4. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door and means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a lever connected to different sections of said flexible member at different points intermediate the length of the lever, said lever normally occupying a position where it is substantially at right angles to said flexible member but being movable into a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree.

5. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door, means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a lever connected to different sections of said flexible member at different points intermediate the length of the lever, said lever normally occupying a position where it is substantially at right angles to said flexible member but being movable into a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree, means for controlling the position of said lever, said means including a member having a socket formed therein into which one end of said lever projects, said member being movable to a position where the lever will drop from said socket, a pivot construction associated with said member to permit said movement, said pivot construction having fusible metal associated therewith which normally prevents movement of said member about its pivot but which will melt when the furnace exceeds said predetermined temperature to permit said movement.

6. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door and means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a lever connected to different sections of said flexible member at different points intermediate the length of the lever, said lever normally occupying a position where it is substantially at right angles to said flexible member but being movable into a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree.

7. In a furnace having a draft door which normally tends to close, a flexible member for controlling said door, means for increasing the effective length of said flexible member when the temperature of said furnace exceeds a predetermined degree in order to permit said draft door to close, said means comprising a lever connected to different sections of said flexible member at different points intermediate the length of the lever, said lever normally occupying a position where it is substantially at right angles to said flexible member but being movable into a position where it is substantially in alignment with said member when the temperature of the furnace exceeds said predetermined degree, means for controlling the position of said lever, said means comprising two members secured together by fusible metal and connected to said lever.

8. In a safety device of the type described, a control member extending from an object to be controlled, means for increasing the effective length of said control member, said means comprising a member connected to said control member, said member being movable from a position where it is substantially at right angles to said control member to a position where it is substantially in alignment with said control member, and means including low melting point metal for controlling the position of said last-named member.

9. In a safety device of the type described, a control member extending from an object to be controlled, means for increasing the effective length of said control member, said means comprising a lever connected to said control member, said lever being movable from a position where it is substantially at right angles to said control member to a position where it is substantially in alignment with said control member, means for controlling the position of said lever, said means comprising a member having a socket formed therein into which one end of said lever projects, a pivot structure for said member for permitting movement of said member to permit the lever to drop from the socket thereof, said pivot structure having fusible metal associated therewith for normally preventing movement of said member.

10. In a safety device of the type described, a control member extending from an object to be controlled, means for increasing the effective length of said control member, said means comprising a lever connected to said control member, said lever being movable from a position where it is substantially at right angles to said control member to a position where it is substantially in alignment with said control member, means for controlling the position of said lever, said means comprising a member connected to said lever and anchored to a support by low-melting point metal.

MURRAY McGEE SWEPSTON.