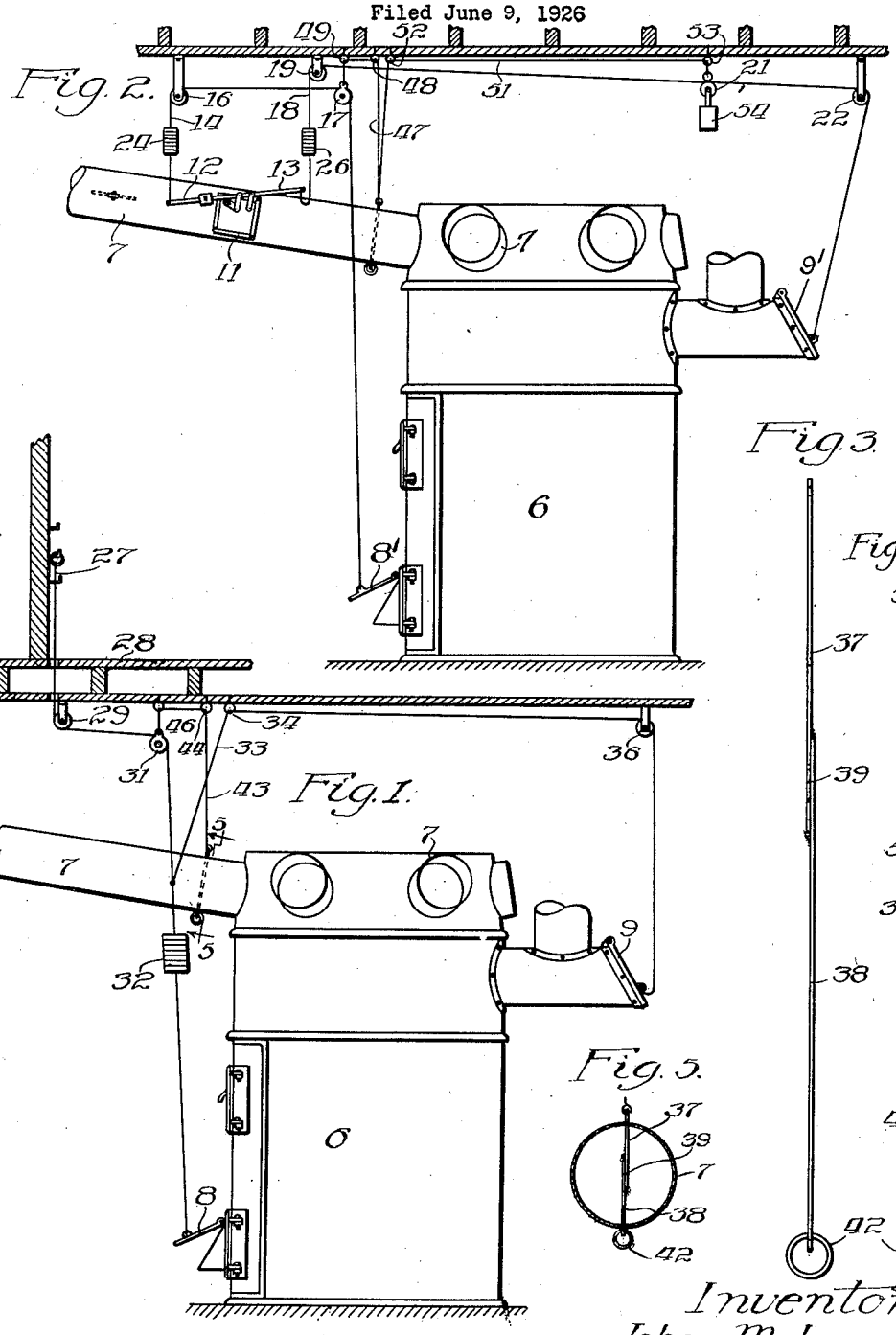
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SAFETY DEVICE FOR HOT AIR FURNACES

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SAFETY DEVICE FOR HOT-AIR FURNACES.

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My invention relates to hot air furnaces and particularly to a safety device for automatically closing the draft door and opening the check door when the furnace becomes overheated.

An object of my invention is to provide a device which may be installed in one of the ducts of a hot air furnace and which will be so constructed that it will fuse at a predetermined temperature and thus check the combustion in the furnace so as to produce a damping action and consequent reduction in temperature.

Another object of my invention is to provide a safety device which may be used in combination with the regulating device shown in my Patent No. 1,593,581, dated July 27, 1926, and when used in connection therewith my improved safety device will prevent any overheating of the furnace caused by the chains in said device running off the pulleys or any other accident which may occur to the parts of the said regulating device.

Other objects and advantages will be readily appreciated as the same become better understood by reference to the description when considered in connection with the accompanying drawing, in which—

Figure 1 is a side view of an ordinary hot air furnace showing my improved safety device applied thereto;

Fig. 2 is a like view showing the safety device applied in combination with the regulator shown and described in the above-mentioned application;

Fig. 3 is a side view of the fusible member;

Fig. 4 is a front view of the same; and

Fig. 5 is a cross-sectional view of the warm air duct taken on the line 5—5 of Fig. 1.

Like symbols of reference herein indicate like parts in each of the figures of the drawing.

Referring to the drawings in detail and first to Fig. 2, the construction shown comprises a hot air furnace which is of any usual or suitable construction which has a hot air chamber, from the upper end of which the usual pipe connections 7 lead. This furnace, as shown, is provided with a draft regulating door 8′ and a draft check door 9′. The door 8′, which is located at a position near the bottom of the furnace, admits air for the purpose of combustion and the door 9′ provides a means for checking the draft and each of these doors is regulated by the temperature control regulator 11 shown in Fig. 2. For the details of operation of this regulator, attention is called to the above-mentioned patent which fully describes the operation thereof and in order to fully understand the safety device herein shown and described, it is sufficient to say that the regulator has arms 12 and 13, the former of which has a flexible pull member 14 extending over a sheave wheel 16 secured to the ceiling of the furnace room and from thence over a pulley 17 (later described) the member 14 being connected at its lower end to the draft door 8′. The arm 13 of the regulator has a flexible pull member 18 passing over a sheave 19 secured in the same manner as the sheave 16, over a pulley 21 (later described), and over a sheave 22 the member 18 being connected to the check door 9′. The flexible pull members 14 and 18 are provided with counterweights 24 and 26 for assisting in balancing the weights of their respective doors when the same are being opened. The automatic regulator 11 is so constructed that on a rise of temperature the arm 12 rises and the arm 13 is depressed. This tends to close the draft door 8′ and if the movement is continued sufficiently it opens the check door 9′, thus checking the fire and tending to lower the furnace temperature. After the temperature drops the arm 12 is lowered and the arm 13 is raised and this permits the closing of the check door 9′ and the opening of the draft door 8′, tending to increase the heated effect.

In the device shown in Fig. 1, wherein the draft door is controlled by means of a flexible pull member 27, extending into the upper floor of the building through the flooring 28, the said flexible member passes around the sheave 29 over a pulley 31 (later described) and is connected to the draft door in like manner. The flexible pull member is provided with a suitable counterweight 32 and at a short distance above the same the flexible pull member 33 is connected thereto, passes through an eye bolt 34 over a sheave 36 and is connected to the check door 9′. If the room becomes too warm the occupant will lower the pull member 27 permitting the draft door 8′ to close and causing the check door 9′ to be opened, thus checking the fire. If the room becomes too cold the occupant will pull up on the pull member 27 opening the draft door 8′ and permitting the check door 9′ to close.

My improved safety device which is intended to prevent any overheating of the furnace and, consequently, the pipe connections or ducts 7, in its preferred form, consists of a pair of strips of metal 37 and 38 which are overlapped and connected together by solder or some fusible metal 39 which fuses at a low temperature, and said jointed strip extends entirely through the center of one of the warm air ducts, as shown in Fig. 5. The lower end of the strip 38 is provided with a series of holes 41 through which may be placed a ring 42, a cotter pin, a bolt or any other suitable limiting member and the upper end of the strip 37, when used in connection with the device shown in Fig. 1, is provided with a flexible pull member 43 which passes through the eye bolts 44 and 46 and supports the pulley 31 over which the flexible pull member 27 passes.

This safety device and regulator are usually placed in the hot air duct leading to the living room or some room where the warm air is always turned on, so that any overheating of the furnace will be immediately checked, which would not always be the case if the device were included in some duct only used at intervals.

In the operation of the device shown in Fig. 1, it will be apparent that when the temperature in the warm air duct rises to a degree sufficient to soften the solder or fusing metal 39, the upper strip 37 will be pulled upward through the opening in the duct. The flexible pull member 43 will be drawn upward and around through the eyebolts 44 and 46 so that the pulley 31 will be lowered and as the flexible pull member 27 tends to straighten out with the assistance of the counterweight 32, the draft door 8 will be closed and the flexible pull member 27 will be drawn outward through the eyebolt 34 and over the sheave 36 in order to open the check door 9. This will produce a dampened action on the combustible material in the furnace and have a tendency to decrease the temperature in the hot air duct.

In the construction shown in Fig. 2 where the safety device is used in combination with the regulator 11, the strip 37 has connected to its upper end a flexible pull member 47 which passes through the eyebolts 48 and 49 and supports the pulley 17 through which the flexible pull member 14 extends, while the flexible pull member 51 also connects with the upper end of the strip 37, passes through the eyebolt 52, the eyebolt 53 and supports the pulley 21 over which the flexible pull member 18 extends.

When the safety device is used in connection with this regulating mechanism, and the joint 39 between the same is fused it permits of upward movement of the strip 37 and the pulley 17 will be permitted to drop by the upward movement of the flexible member 47 through the eyebolts 48 and 49 so that the draft door 8′ will be closed, while the flexible pull member 51, passing through the eyebolts 52 and 53 will permit the pulley 21 to be lowered by the counterweight 54 so that the check door 9′ will be opened.

It will be apparent that, when the furnace has been damped by the operation of the safety device and it is desired to again place the same in operative condition, the strips 37 and 38 can readily be reunited by holding a match or other heat-producing element to the fusible material at the point 39 whereupon they may be passed through the warm air duct and connected in the manner originally described. The gauge hole 56 will indicate the point for re-fusing the strips so that when they are again passed through the duct all the connecting parts will be properly gauged and in their original positions. Ordinarily, no additional fusing material is required as all of the same is retained on the strips at the time of their separation because of the fact that the fusing element 39 does not melt but merely softens to permit the strips 37 and 38 to separate.

It will also be understood that I do not limit myself to strips of the design shown herein and it should be understood that the details of construction are capable of wide modification and variation without departing from the spirit of the invention or sacrificing any of its advantages. Hence, I reserve all such variations, modifications and mechanical equivalents as fall within the spirit and scope of the appended claims.

I claim:

1. The combination with a hot air furnace having heat controlling means and a hot air pipe leading from said furnace for supplying hot air to a room, of means for controlling said heat controlling means to prevent excessive rise of temperature, comprising a pair of strips having overlapping ends secured together by fusible material, said strips when thus secured together forming a bar extending through said hot air pipe, with the overlapping ends located in said hot air pipe, means for preventing withdrawal of said bar from said hot air pipe so long as the two strips are connected together but permitting the withdrawal of both strips when the fusible material fuses, and connections between one of said strips and said heat controlling means.

2. The combination with a furnace having a heat controlling door having a tendency to close, of means for controlling the positioning of said door, comprising a flexible member and a pulley over which said flexible member passes, and heat released means for holding said pulley in position whereby when the temperature becomes excessive said pulley will be released from its operative position and the door will be closed.

3. The combination with a furnace having heat controlling means, of temperature controlled means for moving said heat controlling means to various adjusted positions to maintain an even temperature, and additional temperature controlled means acting on said same heat controlling means to cause said heat controlling means to move to low temperature position upon an excessive rise of temperature notwithstanding the action of said first heat controlled means.

4. The combination with a furnace having heat controlling means, of temperature controlled means for moving said heat controlling means to various adjusted positions to maintain an even temperature, and additional temperature controlled means acting on said same heat controlling means to cause said heat controlling means to move to low temperature position upon an excessive rise of temperature notwithstanding the action of said first heat controlled means, said additional temperature controlled means comprising means for rendering said first temperature controlled means ineffective to control said heat controlling means.

5. The combination with a furnace having a heat controlling door having a tendency to close, of means for controlling the positioning of said door comprising a flexible member and a pulley over which said flexible member passes, and heat released means for moving said door from closed to open position comprising a weight connected with said flexible member and released when the temperature becomes excessive whereby it acts on said door through said flexible member to open it.

In witness whereof, I have hereunto subscribed my name.

JOHN M. LARSON.