# United States Patent [19]

**Meier et al.**

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[54] **REMOVABLE OVEN DOOR GASKET**


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[73] Assignee: **K. & M. Rubber Co.**, Elk Grove, Ill.



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[52] **U.S. Cl.** ..... **126/190**, 49/189

[51] **Int. Cl.** ..... **F24c 15/02**

[58] **Field of Search** ..... 126/190; 49/489, 49/493



[56] **References Cited**

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*Primary Examiner*—Edward G. Favors

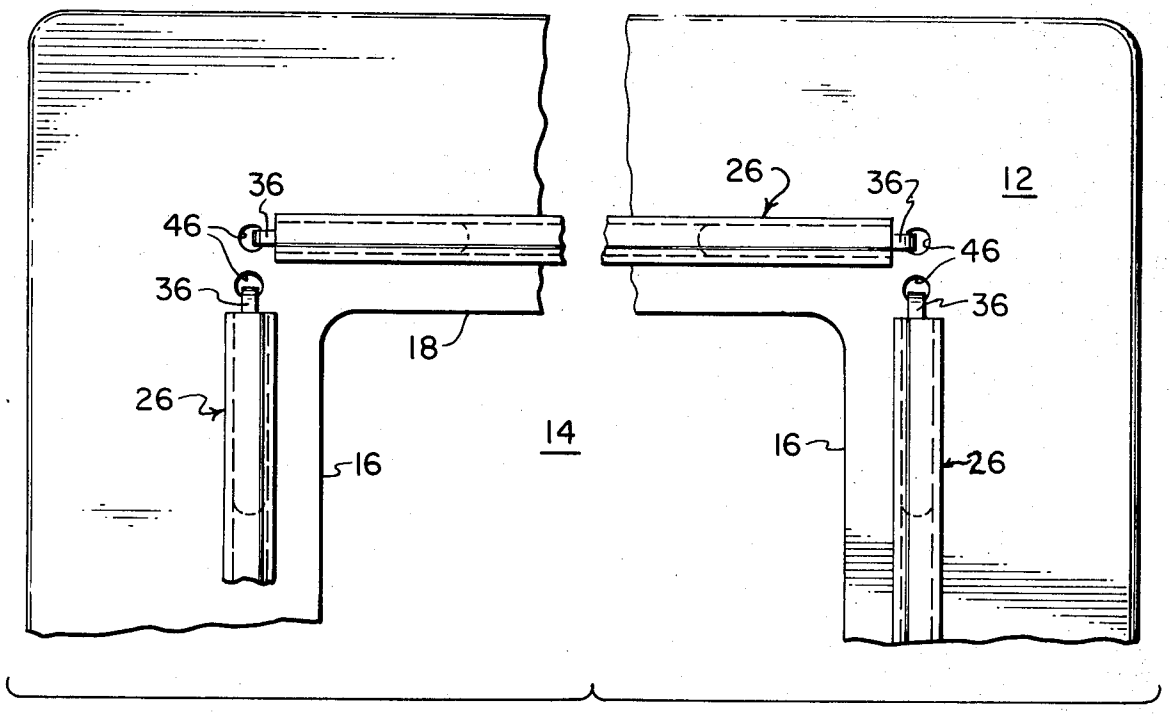
*Attorney*—I. Irving Silverman et al.



[57] **ABSTRACT**

An oven door construction in which the door is adapted to be sealed to a front plane surface when the door is closed. The seal comprises tubular elastomeric gaskets having metal inserts in their ends removably secured to the front plane surface around the oven opening. The inserts are held in place by room temperature vulcanizing adhesive and have structures cooperating with holes in the front plane surface into which the structures are engaged. The gaskets are stretched to make them fit and held in place by tension, while being easily removable to enable the oven front plane surface to be cleaned or the gaskets to be replaced.


**9 Claims, 9 Drawing Figures**



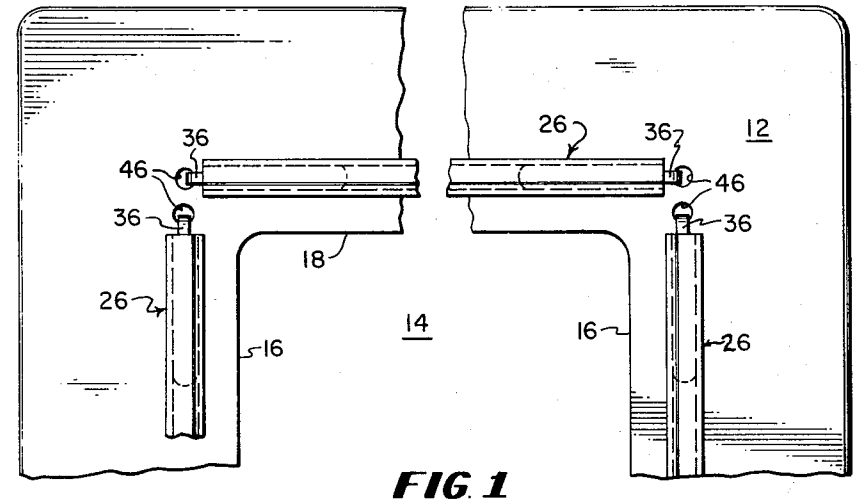
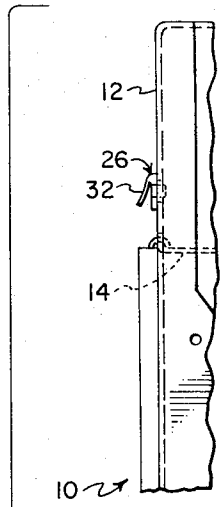



FIG. 1



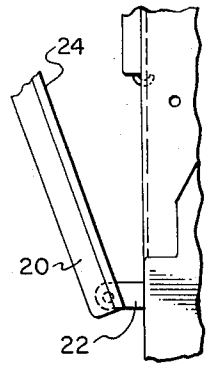




FIG. 2

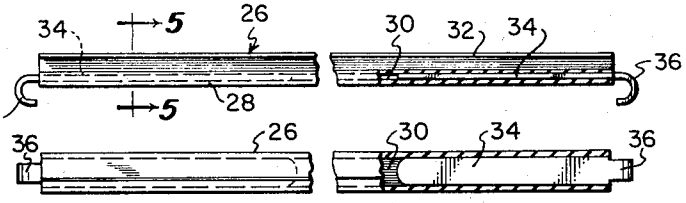



FIG. 3

FIG. 4

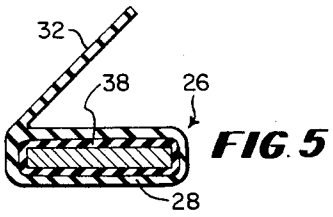



FIG. 5

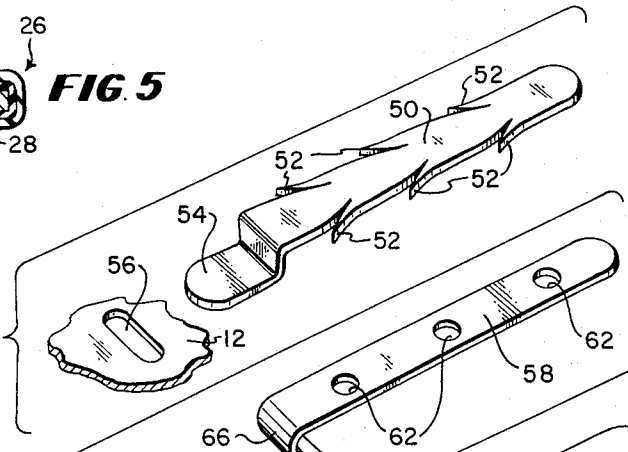



FIG. 6

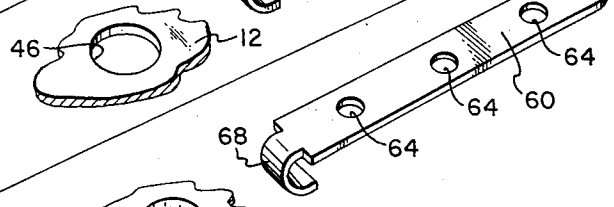



FIG. 7

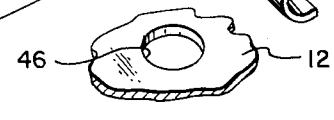



FIG. 8

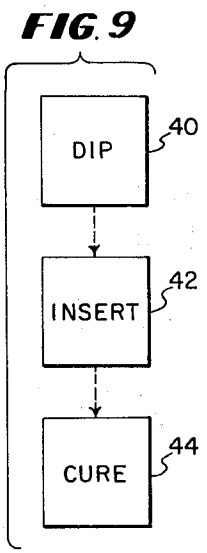



FIG. 9

# REMOVABLE OVEN DOOR GASKET

## BACKGROUND OF THE INVENTION

The invention herein is concerned primarily with the sealing of the doors of domestic cooking ovens and more specifically to a novel gasket for effecting such sealing and a method of making the same.

The invention herein is an improvement over the structures which are disclosed in U.S. Pat. Nos. 3,029,805 and 3,404,675. The first of these patents proposed a gasket in the form of an elongate elastomeric member of tubular form having a strip of metal disposed on the interior thereof along the entire length, with protruding offset end tabs adapted to engage in slits formed in the front plane wall of an oven around the oven door opening thereof. The gaskets were supposed to be removable, but problems arose in manipulating these gaskets. The metal strip had to be flexed or bent in the process, as a result of which the gasket was distorted, and often loosened in place thereby weakening the seal. Since the gasket had to be manipulated by the housewife for cleaning, one could not expect that the mechanical dexterity required to assure proper bending and proper flexing would be had by such person.

The second of these patents proposed the use of a short metal insert at each end of the gasket with an offset tab also adapted to enter slots provided in the oven wall. Since the gasket was intended to be made from an elastomeric material and hence be stretchable, it could be made slightly shorter than the distance between the slots so that it could be stretched and installed and remain tightly in position under some tension. Removing the gasket for enabling cleaning of the oven surface or to replace the same was also a simple process of stretching the gasket enough to relieve the tension on the tabs and removing the tabs from their slots.

The problem raised by the structure of said U.S. Pat. No. 3,404,675 is how to prevent the short metal inserts from being pulled out of the ends of the tubular gasket. The patent proposes the use of barbs formed in the inserts, facing in such a direction that the insertion of the metal member is readily accomplished, but any attempt to pull the insert out of the ends of the gasket was to result in the barb points biting into the interior walls of the gasket. This was to resist removal.

From a practical standpoint, the conditions needed to achieve the operation described are difficult to meet, if not impossible to achieve. In order to dig into the elastomeric material sufficiently to resist withdrawal, the barbs would have to enter so deeply that they would protrude from the exterior of the gasket. Likelihood of tearing is present. Shallow barbs will not hold.

The invention herein solves the problem, eliminating the need for barbs. This results in a saving because the barbs must be stamped into the metal inserts using dies.

The invention herein also proposes a novel structure for holding the gaskets in place and a novel method for making the gaskets.

## SUMMARY OF THE INVENTION

A gasket for use with an oven door for sealing the door when closed against the face of an oven having an opening to be closed by the door comprises an elongate strip of elastomeric material which is hollow at least at its ends. A metal insert is engaged in each end of the strip, being held in place by means of a room temperature vulcanizable adhesive. The protruding ends of the metal inserts have a hooklike configuration adapted to be engaged in suitable perforations formed in the front oven wall. There are two perforations for each side of the oven opening and one gasket is intended to be installed between each pair of perforation along each side of the opening.

Various constructions for the metal insert are contemplated by the invention, including structures having through passageways in the body of the insert to enhance bonding of the adhesive with the interior of the gasket.

The gasket is made by dipping the bodies of the inserts into a container of the room temperature vulcanizing adhesive, inserting the same into the ends of a length of the gasket, and subjecting the resulting assembly to steam for several hours, preferably in an autoclave. This cures the adhesive in moist conditions and forms an excellent bond.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary front elevational view of a cooking oven having gaskets connected thereto which are constructed in accordance with the invention;

FIG. 2 is a fragmentary side elevational view of the oven of FIG. 1;

FIG. 3 is a fragmentary side elevational view of the gasket of the invention, a portion being broken away to show the interior construction;

FIG. 4 is a fragmentary top plan view of the gasket of FIG. 3 with a portion broken away to show the interior construction;

FIG. 5 is an enlarged sectional view taken through the gasket of FIG. 3 along the line 5—5 and in the direction indicated;

FIG. 6 is a perspective view of an insert of the prior art, showing the type of perforation with which the same is used, but which is capable of being improved through the use of the invention;

FIG. 7 is a view similar to that of FIG. 6 but showing a modified form of the invention;

FIG. 8 is a view similar to that of FIGS. 6 and 7 but showing still another form of the invention; and

FIG. 9 is a simplified flow diagram showing the method of making the gaskets of the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to the invention, a sealing structure is achieved by means of a plurality of gaskets which are removably secured around the opening of a cooking oven which is to be closed by an oven door. The door is swung into position over the opening, engaging the gaskets around the opening and compressing the same, thereby preventing the loss of heat from the oven or the transfer of cold air from the exterior of the oven into the cooking chamber.

The gaskets are each expansible, comprising lengths of elastomeric material having hooklike structures at their ends which engage in perforations provided in the front wall of the oven. Each length has an insert in its end in which the hooklike structures are formed, the inserts being held in the respective ends by a strong bond formed between the metal insert and the interior walls of the gasket. The bond is achieved by means of room temperature vulcanizable (RTV) adhesive.

In FIG. 1 there is illustrated the front of an oven **10**, having a front framing wall **12** and provided with a cooking chamber that has an entrance or opening **14** defined by sides **16** and the top and bottom edges **18**. The wall **12** frames the opening **14**. There is a conventional door **20** (FIG. 2) hingedly connected at **22** to the oven **10** and suitably sprung (not shown) to enable its being swung over the opening **14** to confront the wall **12** or swing away from the opening **14** to give access to the cooking chamber. The exact construction of the door and its mechanism is of no consequence to the invention, except for the fact that the interior surface **24** of the door **20** is intended to engage upon the gaskets placed around the opening **14**.

In FIGS. 1 and 2 gaskets **26** are shown engaged adjacent the sides **16** and adjacent the upper edge **18**, these three sides of the opening **14** being the ones usually sealed. Each of the gaskets is constructed in the same manner, the upper gasket being somewhat longer than the other two. Each gasket **26** is easily installed or readily removable, for cleaning the surface of the oven **12** or for replacing the gaskets. The manner in which this is done and the construction of the gaskets will now be set forth.

The gasket **26** is comprised of an elongate rectangular cross section tubular member **28** of elastomeric material, such as for example silicone rubber or the like having a central hollow bore **30** and an exterior protruding flap **32**. The flap **32** is intended to face outwardly when the gasket is installed so that it can be engaged by the door surface **24** and crushed or collapsed to form a tight seal. Any sealing configuration known in the gasket art could be used. The body of the gasket, that is the tubular member **28** may be an extruded form made by any well-known technique.

Each end of each gasket has a metal insert **34** engaged in the hollow bore **30**, each insert being an elongate strip of metal having the integral hook **36** formed on one end. Securement of the insert **34** within the hollow bore **30** is accomplished by means of RTV adhesive **38** bonding the insert **34** in place.

The process of making the gasket **26** is best described in connection with FIG. **9**. The block **40** represents the first station to which the gasket **26** passes in the process of manufacturing the same. At the station **40** which is marked "dip," small containers of RTV adhesive are present. The operator dips the insert **34**, plain end first into the container, holding the hooked end **36**. The adhesive is permitted to cover the entire insert but for the hooked end **36**. The next step is represented by the block **42**, marked "insert." The operator inserts the now coated insert **34** into the ends of the elongate member **28** with the hooked parts **36** both facing in the same direction. The next step is represented by the block **44**, marked "cure." In this step, the gaskets **26** are placed in an autoclave and there subjected to steam for a few hours, preferably about four. The RTV adhesive cures and bonds the inserts **34** to the interior walls of the tubular member **28** as shown in FIG. **5**, forming the coating or connecting structure **38**. It has been found that this bond is so strong that it is impossible to pull the insert **34** out of the ends of the gasket **26** without tearing the gasket. It is assumed that the inserts **34** will be cleaned, degreased, etc. before the dipping step is undertaken, and that the workman will exercise reasonable care in keeping the body portions clean while handling the same.

In use, perforations such as shown at **46** are provided in the wall **12**, there being a pair of perforations for each side of the opening **14** which is to have a gasket connected thereto. Considering the upper gasket **26** in FIG. **1**, the distance between perforations **46** is deliberately made slightly greater than the length of the gasket **26**. To install the gasket, the assembler pulls the gasket endwise and hooks the hooked formation **36** into the respective perforations **46**. This applies tension to the gasket and keeps it tightly engaged against the wall **12**. When the housewife wishes to remove the gasket **26**, she merely applies a stretching force on it and removes it from the perforations **46**, cleans the wall **12** and the gasket **26** and reinserts it in the same manner in which it was originally installed.

RTV adhesive is well known and there are many formulations available on the market. Almost any general adhesive of this type may be used. It is intended to be vulcanized at room temperature but the use of elevated temperatures under moist conditions enhances the bond and hence the curing step which was discussed above which includes subjecting the gasket **26** to steam for several hours. It is pointed out that the gasket **26** during its eventual use is subjected to the heat of the oven itself and this serves further to vulcanize the bond represented by the coating **38** so that the inserts **34** are permanently secured within the tubular members **28**.

In FIG. **6** there is illustrated the type of insert **50** which is disclosed in said U.S. Pat. No. 3,404,675. The barbs **52** are shown formed along opposite edges of the insert and the end has an offset tab **54** which is intended to be engaged in a slot **56** that is perforated in the oven wall **12**. The same type of tab **54** with its accompanying perforation **56** may be used in connection with the gasket **26** in place of the hook. It is preferred, however, to use the hooked portions. If the insert **50** is used together with the vulcanized RTV adhesive **38**, such a structure will be highly effective to prevent withdrawal of the insert **50** from an elastomeric gasket. This is within the scope of the invention.

FIGS. **7** and **8** illustrate inserts **58** and **60** each of which has a series of passageways **62** and **64** respectively punched in the body thereof. These openings become filled with the RTV adhesive during the dipping process represented by the block **40** and hence when cured, there is provided a strong bond in the form of a dowel or connection comprised of cured elastomeric material passing through these passageways **62** and **64**. When the RTV adhesive is cured, it is in effect substantially an elastomeric material, practically as solid as the elastomeric material from which the gaskets **26** are made.

The left-hand end of each of the inserts **58** and **60** is provided with a hooked formation similar to that identified above as **36**. The hook formation **66** has the same width as the body of the insert **58** and it is intended to engage in a large perforation **46**. The hooked formation **68** of the insert **60** is much smaller in width than the body of the insert **60** and is intended to be engaged in a much smaller perforation **46**. It has been found that even this smaller size hook formation is sufficiently effective to hold the gasket in place and the resulting appearance is more pleasant. The hook formations **36** illustrated in FIGS. **1** to **4** are of this latter type.

Variations are capable of being made without departing from the spirit or scope of the invention as defined in the appended claims. For example, the cross-

sectional configuration of the gaskets may be varied greatly in accordance with any available design.

What it is desired to secure by Letters Patent of the United States is:

**1.** In an oven construction including a door and a frame having confronting surfaces, means for sealing the door when closed against the surface of the frame, said means comprising an elongate gasket member of extensile elastomeric material which is stable at the temperatures of operation of the oven, at least the end portions of the gasket member having hollow internal bores, a pair of metal inserts respectively engaged within said bores, each insert comprising a body portion which is relatively short compared with the overall length of the gasket member and the body portions being engaged in the respective bores, elastomeric connecting means between said body portions and the interior walls of said elongate gasket member at said bores, the connecting means being formed by an adhesive of a type which is capable of adhering to the metal of the inserts and the surface of the gasket member in a strong bond not adversely affected by the temperatures of operation of the oven, said inserts each having mounting parts integral with the respective body portions exposed at the ends of the gasket member, and means for removably securing the gasket member by means of such mounting parts to one of the confronting surfaces respectively at points thereon spaced apart a distance greater than the normal separation of the mounting parts, the gasket being stretched in such mounting and held under tension against said one surface.

**2.** The construction as claimed in claim **1** in which the mounting parts comprise hook formations and the means for securing the gasket member comprise perforations in said one surface.

**3.** The construction as claimed in claim **1** in which the adhesive comprises an RTV adhesive.

**4.** The construction as claimed in claim **1** in which said body portions have barbs formed therein to resist pulling said body portions out of the bores of said gasket.

**5.** The construction as claimed in claim **1** in which said body portions have passageway means through the same and the connecting means includes at least one adhesive connection extending through said passageway means.

**6.** The construction as claimed in claim **2** in which the body portions comprise generally flat strips of uniform width substantially the same width as the inner diameter of said bores and said hook formations are substantially narrower than said width.

**7.** The construction as claimed in claim **5** in which said passageway means comprise a plurality of punched out passageways in said body portions.

**8.** A gasket for use in connection to an oven for sealing the door and frame of the oven when the door is engaged to the frame face to face, said gasket comprising an elongate hollow elastomeric extruded member with the ends providing sockets, a pair of relatively short inserts formed from flat strips of metal and each having a generally rectangular body, a hook formation at one end thereof and a plain opposite end, the rectangular body of each being engaged in the socket at one end of the gasket with the hook formation protruding therefrom and there being a bond of cured RTV adhesive interconnecting the body of each insert with the socket in which it is engaged.

**9.** The gasket as claimed in claim **8** in which there are passageways transversely through said body and said bond also extends through said passageways.

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