Dec. 6, 1966 A. W. KRUZAN 3,290,028

GAS FIRED CLOTHES DRYER

Filed June 9, 1964 2 Sheets-Sheet 1

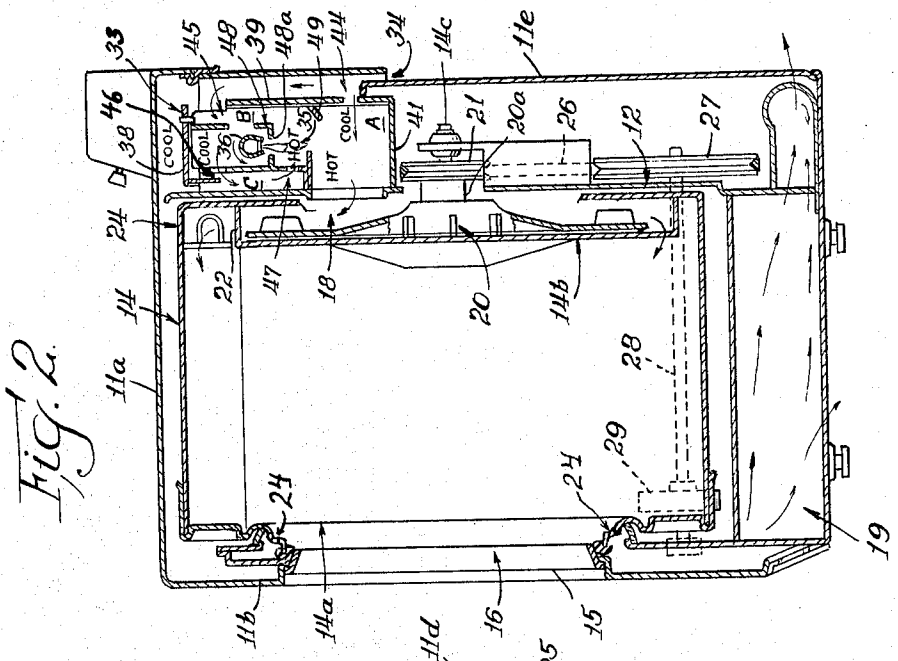


Fig. 2.

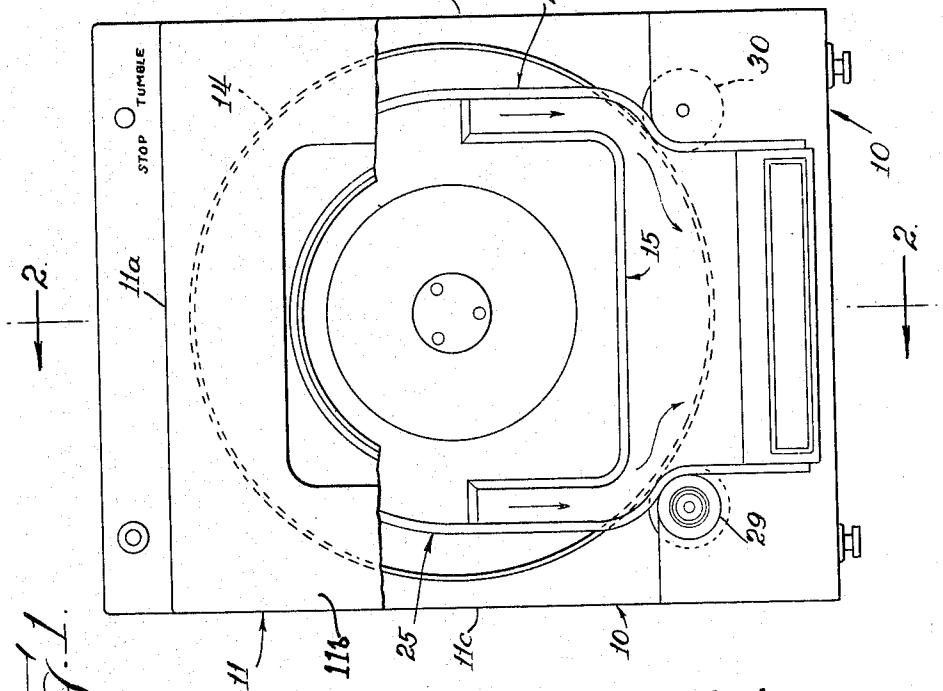


Fig. 1.

Inventor
Albert W. Kruzan
By Peter S. Lucyshyn Atty.

Dec. 6, 1966 A. W. KRUZAN 3,290,028

GAS FIRED CLOTHES DRYER

Filed June 9, 1964 2 Sheets-Sheet 2

Fig. 3.

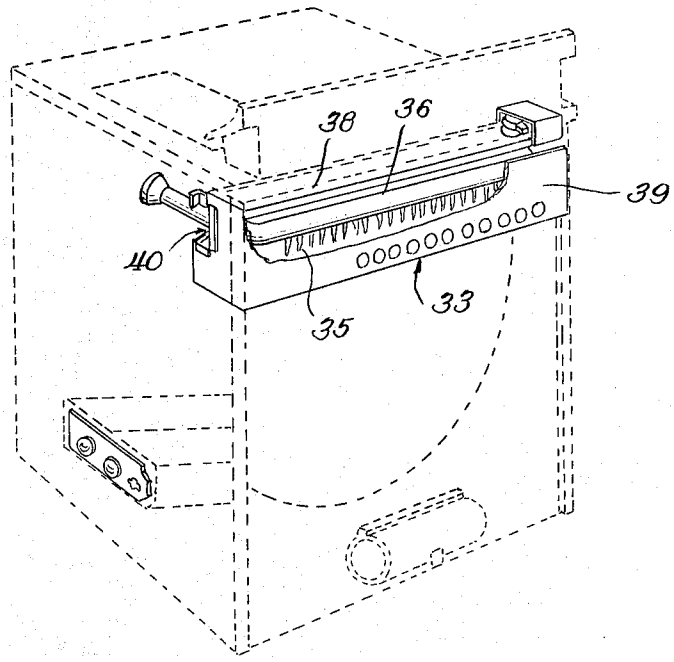
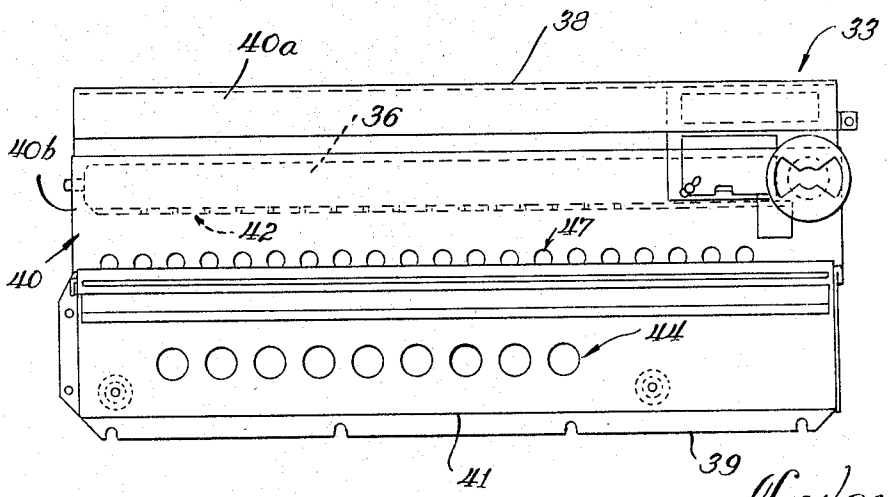


Fig. 4



Inventor
Albert W. Kruzan
By Peter S. Lucyshyn
Atty.

United States Patent Office

3,290,028

Patented Dec. 6, 1966

3,290,028

GAS FIRED CLOTHES DRYER

Albert W. Kruzan, Fort Madison, Iowa, assignor to Borg-Warner Corporation, Chicago, Ill., a corporation of Illinois

Filed June 9, 1964, Ser. No. 373,813
5 Claims. (Cl. 263—33)

The present invention relates to gas dryers of the type generally used in drying fabrics and more particularly to the air heating system in such dryers.

Air is heated in a gas dryer by a gas flame. The flame is maintained in a part of the dryer separated from the container in which articles to be dried are held. Air upon entry into the dryer flows past the flame thereby being heated prior to being fed into the article container. To sufficiently heat the drying air, it is necessary to provide a "high" or hot flame. However, a high flame presents problems because, if not properly housed, it will overheat the exposed structure of the dryer, i.e., the cabinet. This is dangerous, as a housewife can be burned if the cabinet reaches a relatively high temperature. Furthermore, the motor, controls, and other structure is heated above desirable operating temperatures.

Accordingly, it is an object of the present invention to provide an improved structure for housing the flame in a gas dryer which efficiently heats the drying air while insuring that the cabinet, controls, and like structure of the dryer are not raised to an unsafe and undesirable temperature. The present invention will find particular, but by no means exclusive, utility in a gas clothes dryer which utilizes a gas flame to heat air upon entry into the dryer and then directs it through the clothes container and exhausts it from the machine. The present invention being directed to using a burner box which orients the gas flame and provides streams of air thereabout so as to transmit a minimum amount of the heat to the dryer cabinet and controls while efficiently heating the flowing air.

It is a more particular object of the present invention along the lines of the above to improve the air flow system in the burner box portion of a gas dryer to more effectively heat the air by permitting use of a higher or hotter flame than has been heretofore used without requiring elaborate insulating structure.

It is an overall object of the present invention to provide an improved burner box assembly for use in a gas dryer which is economical to manufacture and easy to maintain while being adaptable to standard gas dryers.

These and other objects and advantages of the invention will become more clearly understood from the description of the drawings in which:

FIG. 1 is a front elevation of a gas dryer constructed in accordance with the present invention;

FIG. 2 is a perspective of a gas dryer showing a burner box positioned in the dryer;

FIG. 3 is a section taken along 3—3 in FIG. 1 showing the air circulating paths through the dryer; and

FIG. 4 is an elevation of the burner box.

While the invention will be described with a preferred embodiment, it will be understood that I do not intend to limit the invention to such an embodiment but on the contrary intend to cover all alternatives, modifications and equivalents that may be included within the spirit and scope of the invention as defined by the appended claims.

Turning to FIG. 1 and the gas dryer **10** there shown embodying the present invention, the latter includes an

outer cabinet **11** having a top **11***a*, a front wall **11***b* and side walls **11***c*, **11***d*. A rear cabinet wall **11***e* is best shown in FIGS. 2 and 3. A framework **12** is provided in the cabinet for supporting the operative structure of the dryer. Viewing FIGS. 1 and 2 together, rotatably supported by the framework **12** is a container or drum **14** for receiving clothes and like articles to be dried. Presently, the drum **14** is of cylindrical shape with an open front end **14***a* and a substantially closed rear end **14***b*. An outside door **15** hinged to the cabinet front wall **11***a* permits access to the drum interior through a circular cabinet opening **16** exposing the drum open front end **14***a*.

For directing dry hot air into the drum **14** and removing moisture-laden air therefrom, an air circulation or duct system is provided. The duct system includes an input **18** for receiving hot air and directing it to the drum **14**, and an output opening **19** for carrying away moisture-laden air from the drum **14**. Air is forced into the drum by a blower **20** rotatably mounted on framework **12** adjacent the drum end **14***b*. The blower has an integral hub **20***a* coaxial with a rear drum support shaft **14***c* and is mounted for independent rotation with respect to the drum. The hub **20** is coupled to a drive pulley **21** which is rotated to impart rotation to the blower. The rear portion of drum **14** has a series of openings in an annular axially projecting portion **22** for receiving hot air from the blower **20**. The air, after absorbing moisture from the clothes, is blown out the front of the drum by way of a series of openings in an annular wall portion **24** comprising a part of the drum front end **14***a*. An arcuate duct **25** is provided about the door opening **16** to communicate with the drum openings **24** and receive the expelled moisture-laden air. The duct system output **19** receives the moist air and carries it rearwardly along the bottom of the cabinet **11** to a suitable exhaust connection (not shown).

In the illustrative embodiment one motor (not shown) powers both the blower and drum. Coupling is through a common belt **26** which rotates the blower drive pulley **21** and a drum drive pulley **27**. As described, the blower drive pulley is directly connected to the blower hub. However, the drum drive pulley **27** transmits drive to the drum indirectly through a drive shaft **28** and a drive wheel **29** in contact with the front portion of the side wall of the cylindrical drum. Front end support for the drum is provided by the drive wheel **29** on one side and an idler wheel **30** on the other side (see FIG. 1).

For heating the air prior to feeding it into the drum **14**, a burner box assembly **33** is provided in the input side of the air flow system. As herein illustrated, the burner box is of generally longitudinal shape and is mounted in the upper rear portion of the cabinet interior, i.e., adjacent the intersection of the cabinet top **11***a* and rear wall **11***e*. Relatively cool air is drawn by the blower **20** into the cabinet interior and into the burner box assembly **33** through an opening **34** in the cabinet rear wall **11***e*.

In accordance with the present invention, a flow of air is maintained through the burner box assembly **33** from top to bottom and about a flame **35** to carry heat away from the flame while preventing the cabinet top, walls and structure within the dryer cabinet from overheating. As herein illustrated, the burner box assembly includes a burner **36** disposed longitudinally in an upper portion of the burner enclosure defined by a cover **38**, a rear wall **39**, a front wall **40**, and a bottom **41**. The preferred embodiment of burner **36** has a plurality of openings **42** along its underside (see FIG. 4) for directing gas to the

flame 35 which projects downwardly. The burner is supported in along a substantially horizontal axis.

The air drawn through the cabinet opening 34 enters the illustrated burner box assembly by way of the rear wall, either through a plurality of circular openings 44 near the bottom of the assembly providing a first stream of air, or through a longitudinal slot 45 adjacent the top of the assembly providing a second stream of air (see FIG. 3). The air entering the bottom openings 44 maintains a relatively cool zone A in the lower rear portion of the burner box assembly.

The air entering the top of the burner box assembly splits into several paths. To establish a pair of relatively cool zones B and C on either side of the burner and flame, one air flow path is along the rear wall 39 and another air flow path is over the top of the burner 36 and through a longitudinal opening 46 established by setting out an upper front wall portion 40*a* in relation to a lower front wall portion 40*b*. This latter flow of air re-enters the burner box assembly through a plurality of openings 47 (see FIG. 4) in the lower wall portion 40*b* and thereby maintains a relatively cool air zone C above and in front of the burner and flame. It is, of course, clear that though the air is identified as relatively cool, it becomes heated in traveling through the respective zones. However, by maintaining a continual flow of fresh air into the zones, the areas about the burner flame are maintained cooler than if the hot flame or hot air leaving directly from the flame were passed through the zones and in contact with the burner box assembly structure.

The main air path or stream is centrally through the burner box. To channel the main air to flow on either side of the flame to efficiently heat it as well as aid in establishing the cool zones A, B, and C, a deflector 48 is provided. The latter is mounted, in the present instance, below the burner 36 on the lower front wall portion 40*b* of the burner box assembly and is provided with a longitudinal slot 48 through which the flame 35 projects. The air flow is down through the opening and on either side of the flame thereby maintaining a flame tip 35*a* below the burner 36.

After being heated by the flame, the air passes into the lower portion of the burner box assembly and is deflected by a diverter 49 mounted on the rear wall 39 above the openings 44. This directs the hot air into the duct system input 18 for subsequent blowing into the drum 14. The diverter member 49 is positioned between zones A and B and serves to direct the air from these zones into the main stream of hot air flow where it mixes and becomes heated after performing its cooling or insulating function.

From the foregoing, it is clear that the novel burner box assembly here shown utilizes both a downwardly projecting gas flame and a downward flow of air to insulate the outer structure of the burner box assembly from the flame and main stream of hot air. By maintaining the outer structure of the burner box assembly cooler, the dryer framework structure supporting, and in proximity with, the burner box assembly is also maintained at a safe, relatively cool temperature. On the other hand, a continual flow of air is maintained about the flame 35. This assures a maximum exposure of air to the flame for efficient heating of the air. Thus, the heat produced by the flame is efficiently utilized to improve the overall operation of the dryer.

Although a plurality of openings have been here shown as provided in the underside of the burner 36, it would be possible to use a single opening for providing a downwardly projecting flame. The important operation of the present invention is to provide a downwardly projecting flame so that the upper portion of the burner assembly is not heated, as well as directing streams or paths of air about the main heating portion of the assembly, the burner and flame portion, so as to insulate the latter from the burner assembly outer structure and thereby prevent overheating of the latter. The advantageous result is that an efficient yet safe dryer operation is effected.

What is claimed is:

1. In an air heating system for a gas dryer of the type customarily used for drying clothes, the combination comprising: a cabinet having a top and sides; a framework within said cabinet; a container for receiving articles to be dried rotatably mounted on said framework; a duct system having an input for directing air into said container and an output for carrying air out of the container; a burner box mounted on said framework below said cabinet top and having an air input for receiving fresh air from outside the cabinet and an air output for directing heated air into the input of said duct system; a burner mounted in said box having at least one opening in its underside for feeding gas to a downwardly projecting flame having a tip; and a deflector in said box disposed below said burner and having a longitudinal opening through which said gas flame projects, said burner box air input directing the entering fresh air downward carrying the heat of the flame away from said cabinet top and sides and into said duct system input and maintaining said flame tip below said burner, preventing overheating of said cabinet top and sides.

2. In an air heating system for a gas dryer of the type customarily used for drying clothes, the combination comprising: a cabinet; a framework within said cabinet; a drum for receiving articles to be dried rotatably mounted on said framework; a duct system having an input for directing air into said container and an output for carrying air out of the container; a burner box assembly mounted on said framework having an air input for receiving fresh air from outside the cabinet and an air output for directing heated aid into said duct system input; a burner mounted in said box and having its axis substantially horizontal with a plurality of openings in its underside for feeding a gas flame having a tip, and a deflector in said box disposed below said burner and having a longitudinal opening through which said gas flame projects, said deflector defining a main air stream substantially through a central portion of said burner box assembly, said main air stream being directed downwardly about said burner, past said flame and through said longitudinal opening so as to maintain said flame tip below said burner and carry the heat of the flame away to prevent overheating of said dryer cabinet and framework, respectively.

3. The combination of claim 2 and including means for establishing a pair of cooling air streams on each side of the main heated air stream to effect relatively cool air zones about the main heated air zone.

4. In an air heating system for a gas dryer of the type customarily used in drying clothes, a combination comprising: a cabinet having a top and side walls; a framework within said cabinet; a drum for receiving articles to be dried rotatably supported on said framework; a duct system having an input for directing air into said drum and an output for removing air from the drum; a burner box assembly mounted on said framework at the rear of said cabinet and having an air input for receiving fresh air from outside the cabinet and an air output for directing heated air into the input of said duct system, said box assembly having a cover, bottom and front and rear walls respectively; a burner mounted in said assembly and having at least one opening in its underside for feeding gas to a downwardly projecting flame having a tip; said air input including upper and lower openings respectively in said burner box assembly rear wall for receiving air, said lower openings providing a source of relatively cool air for maintaining the lower portion of said burner box assembly cool, said upper openings providing a source of air for first passing in proximity and about said burner flame and secondly, for substantially surrounding said burned and flame with relatively cool air to insulate the burner and flame from

contact with outer portions of said burner box assembly, said respective streams of air combining and leaving the lower portion of said burner box assembly and entering the input of said duct system.

5. The combination of claim 3 and including respective upper and lower openings in said burner box assembly front wall to direct air from said burner box rear wall upper opening above said burner and along the front of said burner box front wall to insulate the upper and front portions of said burner box assembly from the high heat of said burner flame and hot air directly contacting said flame.

References Cited by the Examiner

UNITED STATES PATENTS

2,018,505	10/1935	Suhr	263—19
2,225,775	12/1940	Garrett	126—110 X
2,673,727	3/1954	Smith	263—33
2,690,905	10/1954	Smith	263—33

FREDERICK L. MATTESON, JR., *Primary Examiner.*

JOHN J. CAMBY, *Examiner.*