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Nelson et al.

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[54] **HEAT SETTING APPARATUS**

[75] Inventors: **George H. Nelson**, Rockford; **Jerry L. Boomers**, Grand Rapids; **Robert B. Egtvedt**, Comstock Park, all of Mich.

[73] Assignee: **Wolverine World Wide, Inc.**, Rockford, Mich.

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[52] **U.S. Cl.** ..... **12/1 A**

[51] **Int. Cl.** **A43d 00/00**

[58] **Field of Search** ..... 12/1 R, 1 W, 1 A, 12/142 R

[56] **References Cited**

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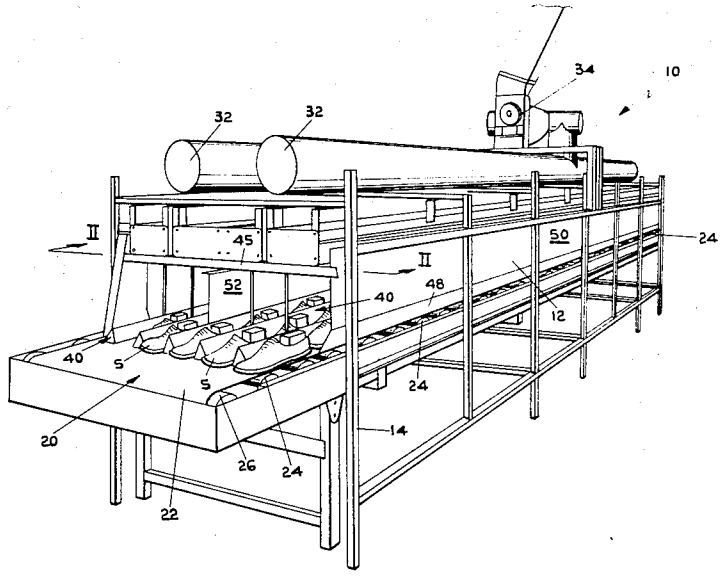
Primary Examiner—Patrick D. Lawson

Attorney—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

Apparatus for heat setting shoe uppers to conform to a shoe last in a heating chamber by means of direct and indirect radiant energy. Reflective triangular shaped guide ways extend along the length of a conveyor upon which lasts and uppers are transported to provide for both direct and indirect radiation of the energy to the shoes carried on the conveyor. The energy source is positioned above the conveyor to direct the rays downwardly toward the top of the shoe, providing the direct radiation while at the same time the reflected or indirect radiation from the reflective guide ways acts upon the sides of the shoe.

8 Claims, 2 Drawing Figures



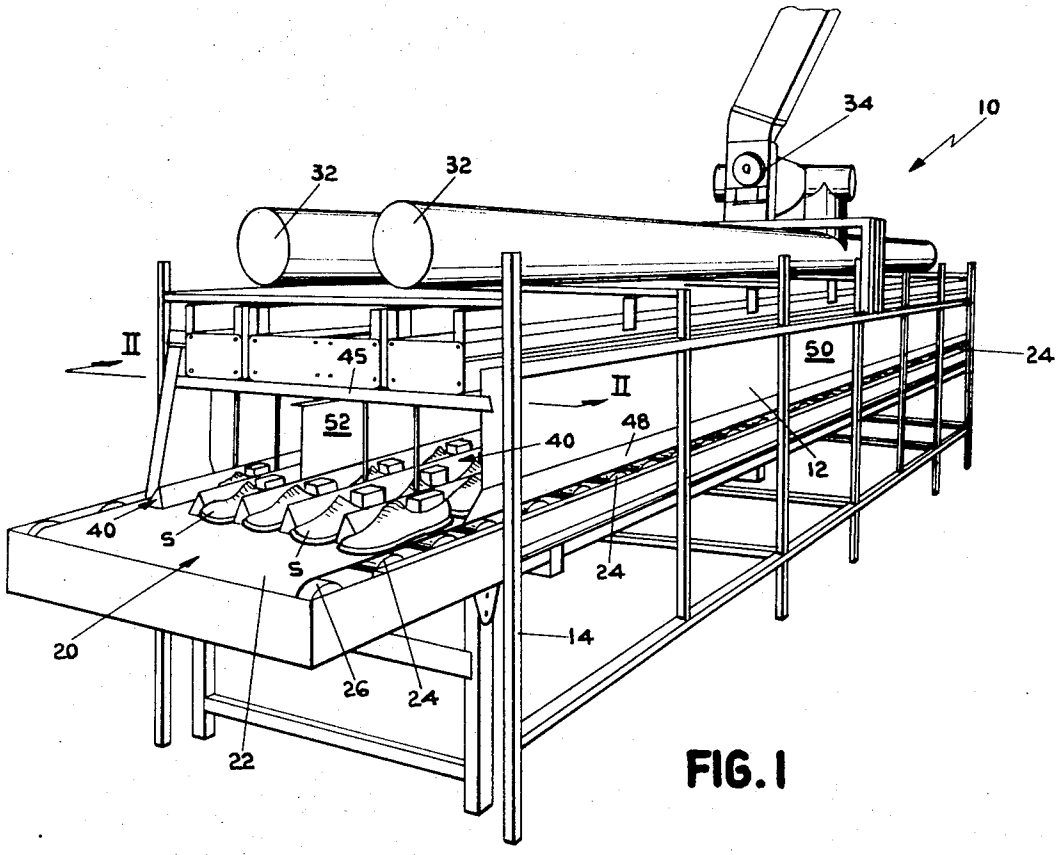

34
10
32
32
II
45
50
24
II
52
48
40
12
40
S
S
24
20
14
26
24
22

FIG. 1

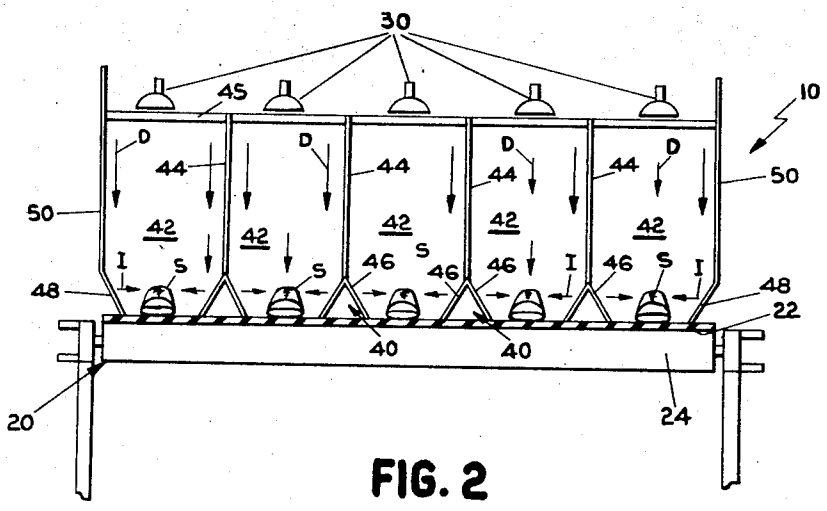

30
45
10
D
D
D
D
44
44
44
44
50
50
42
42
42
42
42
I
S
S
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46
I
46
S
I
48
48
22
40
40
20
24

FIG. 2

HEAT SETTING APPARATUS

BACKGROUND OF THE INVENTION

In the manufacture of shoes or the like, the upper is formed over a last as one step in the complete manufacturing operation. Generally, the upper, when mounted on the last, is treated with moisture or live steam which renders the upper flexible so that it may readily conform to the shape of the last. The stress set up in the upper due to the lasting operation is relieved by quickly drying the uppers, the moist heat serving to relieve the stresses and set the upper in the shape of the last. The upper, still on the last, is then subjected to a drying operation to quickly withdraw the moisture from the upper before it penetrates and disperses throughout the upper. During the drying operation, the upper and last are transported on a conveyor below a source of infrared energy. Conventionally, this is accomplished by providing a plurality of infrared heat sources adapted to direct rays of infrared energy directly down on the upper. The infrared source is normally located above the conveyor and directs the rays downwardly onto the top of the upper. In devices of this type, it has been found that the top of the upper sets more quickly than the sides. Therefore, it is necessary to provide additional infrared heat sources to direct the infrared energy toward the sides of the upper. The additional energy sources increase cost both in power consumed and in the cost of the additional heating elements.

SUMMARY OF THE INVENTION

The present invention provides an apparatus wherein a plurality of radiant energy generators are mounted above the conveyor and a plurality of triangular-shaped reflectors form guide members for the shoes by forming aisles along the length of the conveyor. The direct rays from the generators impinge upon the top of the upper and are also reflected by the triangular reflectors toward the sides of the shoe. The triangular reflectors successfully aid in the uniform heating of the top and the sides of the uppers while at the same time providing guide ways for the shoes as they travel along the conveyor during the heat treating operation.

Accordingly, it is an object of the present invention to provide a heat treatment apparatus for shoe manufacturing.

It is another object of the present invention to provide a heat treating apparatus which utilizes both direct and indirect radiation for the treatment of a lasted shoe upper.

It is another object of the present invention to provide a heat treating apparatus wherein uniquely configured guide ways serve to guide the lasted shoe upper along the conveyor while at the same time serve to reflect the source of energy toward the sides of the lasted shoe upper.

Other important objects and advantages and features of the present invention will become readily apparent to those skilled in the art upon reading the following specification and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the heat setting apparatus incorporating the present invention; and

FIG. 2 is a cross-sectional plan view taken along the plane II—II of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the heat setting apparatus indicated generally by the numeral **10** includes an elongated heating chamber **12** mounted in a supporting framework **14** formed of vertical and horizontal cross members adapted to support the apparatus. Conveying means **20** is provided for transporting the lasted shoe uppers through the chamber at a predetermined rate so that the uppers are subjected to the heat for a preestablished time to properly set the upper. The conveying means **20** is conventional in construction and includes an elongated endless belt **22** mounted on rollers **24** and terminal pulleys **26** at either end. Suitable conventional driving means (not shown) is provided for moving the belt along the length of the heat treating apparatus.

An array of radiant energy generators or infrared heating elements **30** (FIG. 2) are positioned a slight distance above the conveyor **20** along its length and are adapted to direct rays of infrared energy downwardly toward the conveyor surface. This direct radiation is indication by the arrows "D" in FIG. **2.** Conventional exhaust ducting **32** and an exhaust blower **34** are positioned above the energy generators to expell any excessive heat generated within the chamber.

Basically, that which has been described above is conventional and well-known in the art. The electromagnetic radiation "D" from the generators **30** conventionally impinges directly down on the shoe upper "S" positioned on the conveyor **20** to set or otherwise cure the upper material. One of the basic problems, however, of the prior art devices resides in the inability of direct radiation to adequately set the side and edge surfaces of the lasted shoe uppers as they pass on the conveyor below the infrared heat sources. For this reason, many prior art devices have relied on additional infrared generators placed at differing positions about the conveyor in efforts to direct radiation toward the side surfaces of the article. As those skilled in the art will immediately recognize, this requires an extremely wide conveyor to adequately handle a plurality of rows of articles and generators. In addition, there is a considerable expense involved when additional source generators are used, not only in the original cost and replacement costs, but also the increased power consumption.

The improvement of the invention, therefore, resides in the provision of a unique combination guiding means for the lasted shoe uppers and reflective surfaces formed on the guide means to provide indirect radiation to the sides of the lasted shoe uppers during heat treatment.

Triangular-shaped guide members **40** are positioned in aligned rows and extend along the length of the conveyor through the heating chamber **12.** The guide members cooperatively form a plurality of aisles **42** between each pair of reflectors. The shoes are placed for treatment on the conveyor in these aisles.

The guide members **40** are fixed and held in position by support struts **44** fixed to overhead supporting members **45** adjacent the generators **30.** The sides **46** of the guide members **40** are preferably in the shape of an equilateral triangle. That is, they have internal angles equal to approximately 60° with respect to the base. The sides **46** of each guide are arranged slightly higher

than the height of the side of the lasted shoe uppers which are transported on the conveyor.

The radiation "D" directed downwardly toward the surface of the conveyor from the generator **30** is reflected by the sides of the guide members and is directed toward the sides of the lasted uppers. This indirect radiation is indicated by the arrows "I" extending horizontally and generally parallel to the conveyor surface in FIG. **2.** The outermost guide members **48** on either side of the conveyor may be conveniently formed in the side walls **50** of the treatment apparatus. The guides **48** on the side walls are positioned at the same angle, i.e., 60°, with respect to the horizontal surface of the conveyor **20.** The angle of the walls of the guides **46** or **48** with respect to a horizontal defined by the conveyor surface may conveniently lie between 40° to 70°. An angle of approximately 60° is preferable.

The apparatus normally treats or sets the material for about six minutes. This, of course, may be varied depending upon the particular material, its color or other variables by changing the speed of the conveyor. Alternately, the treatment of the upper may be varied by varying the pulsations, intensity or the number of infrared source generators **30** acting along the length of the conveyor in each aisle. In the event it is desired to treat articles at different rates, one or more of the support strut members **44** may be in the form of a solid elongated sheet metal wall panel **52** (FIG. **1**) extending along the length of the conveyor. The wall **52** will prevent radiant heat from one aisle from entering adjacent aisles. The generators **30** in each aisle may be individually controlled in a conventional manner.

In operation, lasted shoe uppers "S" are positioned on the conveyor in one of the plurality of aisles **42** formed between the guides **46** or **48.** Direct radiation "D" is directed toward the top portion of the upper from the generators **30** while at the same time the indirect radiation "I" is directed toward the side surfaces of the uppers from the reflective guide surfaces **46.** The lasted shoe upper travels along the length of the conveying apparatus for a predetermined time to the terminal end where it is removed and passed on for further processing.

It will be readily apparent to those skilled in the art that the present invention through its unique arrangement of reflective guide ways providing indirect radiation toward the shoe sides effects a uniform heat treatment of a shoe upper in a manner heretofore unknown.

It will, of course, be recognized gy those skilled in the art that other embodiments and modifications of the invention incorporating the teachings hereof may be readily made in the light of this disclosure. Accordingly, all modifications employing the principles of this invention are to be considered as included inthe appended claims unless these claims by their language expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. In an infrared heating apparatus having article conveying means and radiant energy generating means positioned above said conveying means adapted to direct radiant energy toward said conveying means and articles carried thereon, the improvement comprising:

a plurality of guide means positioned adjacent said conveying means and extending along the length thereof, said guide means being spaced apart across the width of said conveyor to thereby form a plurality of article-receiving aisles on said conveyor, said guide means including a plurality of wall members extending upwardly from said conveyor at an angle with respect thereto, each said wall member having reflective surfaces thereon for receiving said radiant energy such that said downwardly directed radiation is indirectly reflected toward the sides of said articles carried on said conveyor.

2. The apparatus as defined in claim **1** wherein said angular wall members are positioned at an angle with respect to the horizontal defined by said conveyor surface of about 40° to about 70°.

3. The apparatus as defined in claim **2** wherein said angle is about 60°.

4. In a shoe making apparatus for heat setting an upper on a last, the improvement comprising:

a source for generating infrared radiation;

conveying means for conveying aritcles in the path of said radiation;

a plurality of guide means positioned adjacent said conveying means and extending along the length thereof for guiding said articles through said radiation path; and

angularly positioned wall means on said guide means extending upwardly from said conveying means, said wall means having reflective surfaces thereon for receiving and for directing said radiation toward the side surfaces of said articles.

5. The apparatus as defined in claim **4** wherein said source is positioned above said conveying means and is adapted to direct said radiation downwardly and said angularly positioned wall means on said guide means is positioned at an acute angle with respect to said source to thereby receive and direct said radiation at an angle generally perpendicular to the angle of reception of said radiation.

6. The apparatus as defined in claim **1** and further including second wall means extending upwardly from at least some of said first-mentioned angularly positioned wall means, said second wall means dividing the aisles on opposite sides of said first wall means into individual heating zones.

7. The apparatus as defined in claim **6** wherein said angular wall means are positioned at an angle with respect to the horizontal defined by said conveying means of about 40° to about 70°.

8. The apparatus as defined in claim **7** wherein said angle is about 60°.

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