

United States Patent

Robinson

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[54] **BLOWN FILM TUBE COLLAPSING**

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[73] Assignee: **Phillips Petroleum Company,**

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264/209, 264/237, 264/348

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[58] Field of Search..... **264/95, 89, 99, 94, 237, 40,**
264/209, 210, 348

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[57]

ABSTRACT

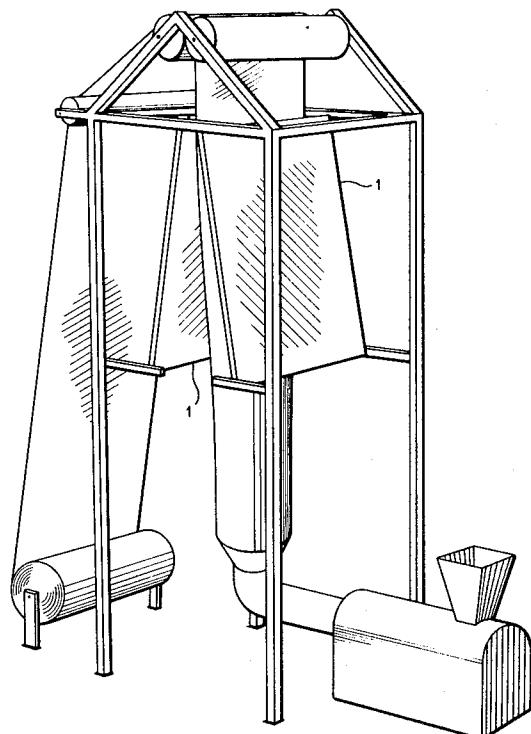
A blown film tube collapsing frame comprising two separate plenum chambers having perforate metal surfaces facing a blown film, tube or bubble is used to force air through the perforations in said surface to collapse the tube or bubble. Each plenum chamber contains adjustable baffles, movable by ropes to fit any size bubble, to ensure the air egress through the perforations immediately adjacent the bubble. Magnets imbedded into the surface of the baffles ensure contact of the perforated plate and the baffles.

[56] References Cited

1 Claim, 3 Drawing Figures

FOREIGN PATENTS OR APPLICATIONS

250,616 4/1964 Australia **264/95**



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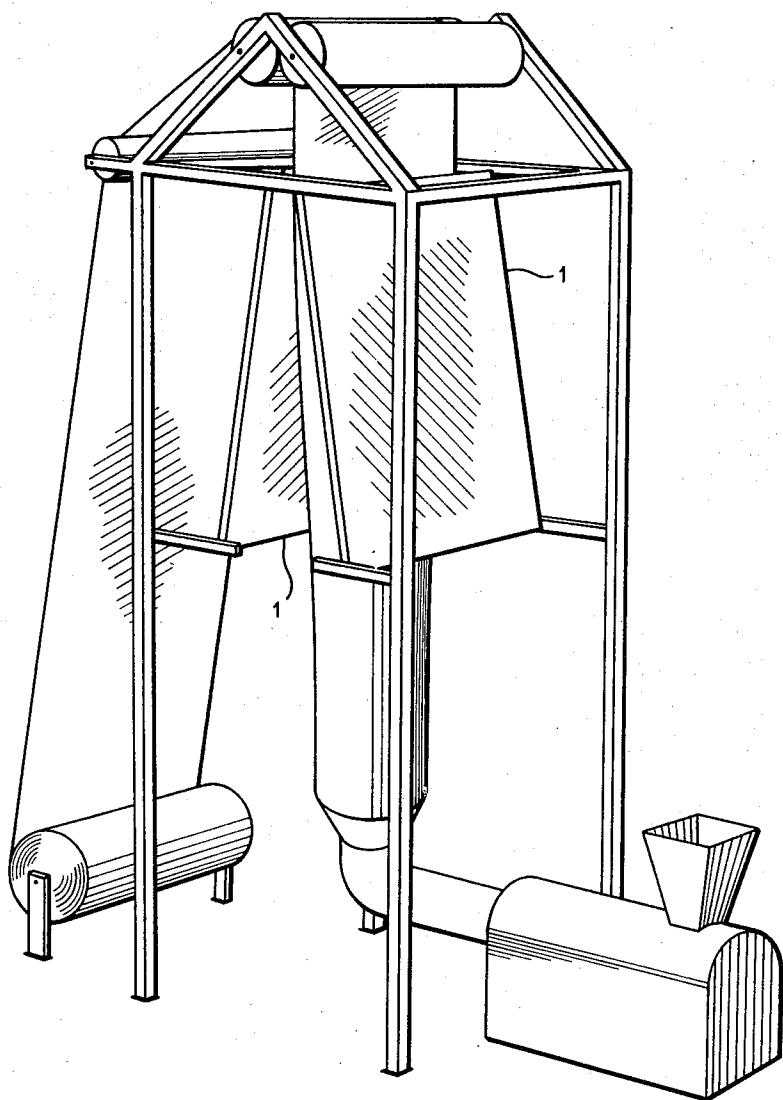


FIG. 1

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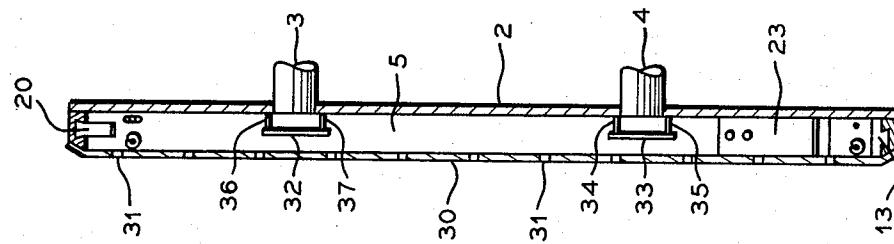


FIG. 3

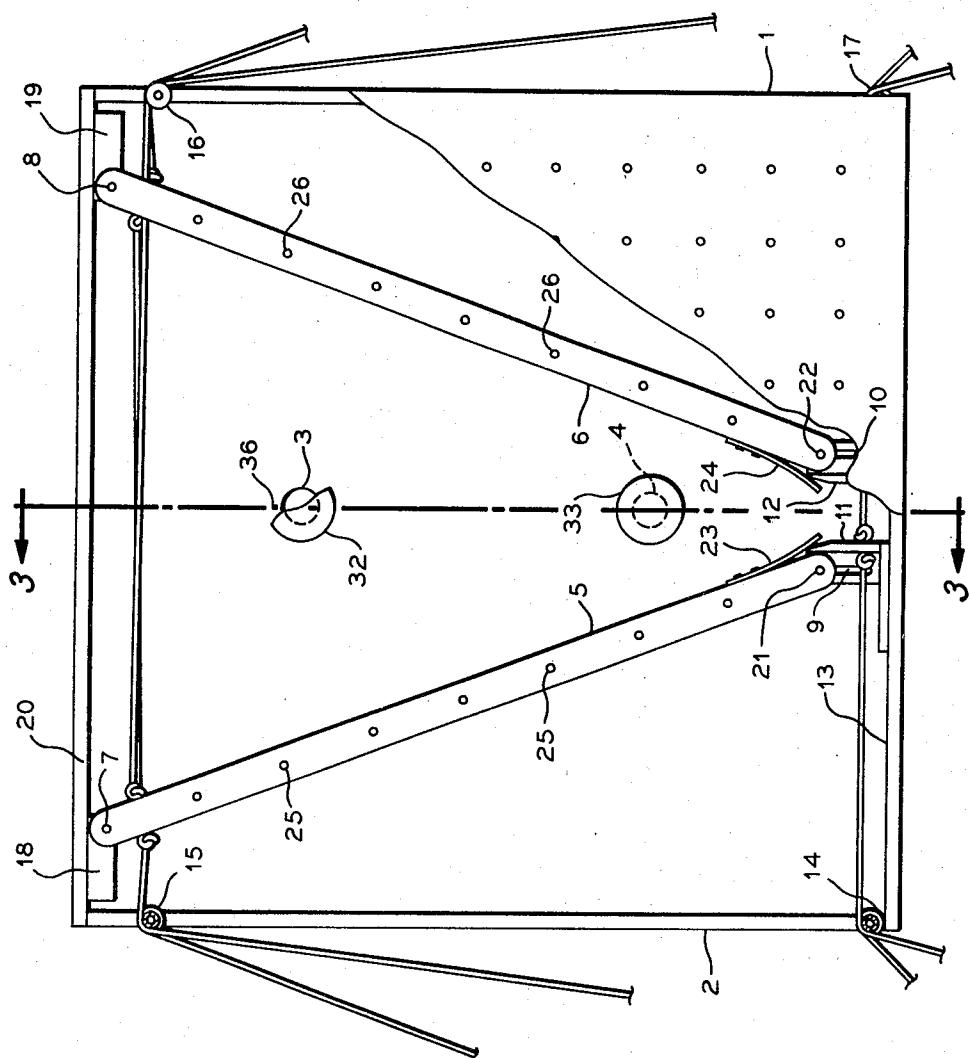


FIG. 2

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BLOWN FILM TUBE COLLAPSING

This invention relates to collapsing of a blown film tube or bubble. It also relates to a bubble collapsing frame assembly.

In one of its concepts the invention provides a method for collapsing a blown film, tube or bubble which comprises forcing air through perforate surfaces of collapsing frame members onto the surface of the film bubble. In another of its concepts the invention provides a film, tube, or bubble collapsing frame comprising at least one, but preferably two, separate plenum chambers which have perforated metal surfaces facing the film bubble and into and through which air can be forced onto the surfaces of the bubble to collapse the same. In a further concept of the invention it provides within the plenum chamber a baffle system, for example, two baffles, which can be adjusted, as by ropes, to cause the air within the plenum chamber to emerge therefrom, largely onto the bubble.

It is known in the art to extrude a tubular film or bubble, as of plastic, extruded from an extruder, the bubble being inflated by means of fluid pressure conducted onto a tube as it is extruded from the extruder. The bubble is then later collapsed by a collapsing frame.

Collapsing frames having various structures are known. Frames having rollers, wire mesh, perforation or simply plates in the surfaces used to collapse the bubble are known. For example, U.S. Pat. No. 3,221,370, issued Dec. 7, 1965, discusses a cooling shield with baffles being utilized to assure uniform distribution of the heat exchange medium therein. "German Plastics", Aug. 1967, pages 607-618 shows in Figure 14 a plate portion which is perforate.

It has now occurred to me to provide a collapsing frame comprising at least one, but preferably two, or more, plenum chambers having perforate faces adjacent the film bubble to be collapsed and to blow air through the perforate faces so as to cool and/or to lubricate the movement of the film or plastic against the face or faces of the collapsing frame chamber members. In lieu of flat faced plenum chamber or chambers there can be substituted within the scope of the several concepts of the invention a conically shaped chamber which can be designed to be sized by adjustment as by having plates slidably engaging and, therefore, telescoping into each other.

Further, it has occurred to me to place within such plenum chamber, as herein described, one or more, preferably at least two, baffles to permit forcing the air out from the chamber onto the film surface in a manner as desired.

An object of the invention is to provide method for collapsing a blown film tube or bubble. Another object of the invention is to provide an apparatus or assembly for collapsing a blown film tube or bubble. It is a further object of the invention to provide a method and apparatus whereby to adjust the egress of air from a collapsing frame so as to cause it substantially to impinge, as desired, upon a blown film tube or bubble being collapsed thereby.

Other aspects, concepts, objects and the several advantage of the invention are apparent from a study of this disclosure, the drawing and the appended claims.

According to the present invention there is provided a method for collapsing a blown tube film which comprises passing the same into a collapsing frame and

maintaining a flow of air on the surfaces of the frame and film during the collapsing thereof.

Further, according to the invention the air flow will be sufficient to lubricate the passage of the film through the collapsing frame as by maintaining a thin film of air between the plastic film or tube and the face of the collapsing frame adjacent to the film.

Thus, according to the method of the invention there is provided at least one plenum zone into and through 10 and out of which air is blown onto the film being collapsed. Still further according to the invention there is provided a blown film tube collapsing frame assembly comprising a plenum chamber disposed to cause collapsing of a tube passing adjacent thereto, a perforate face in said chamber adjacent said tube and air inlet means into said plenum chamber.

Further according to the invention there is provided within the plenum an adjustable baffle system so constructed and arranged that the air flow in and from said 20 chamber through the perforate phase is directed primarily onto the surface of the tube being collapsed.

In one embodiment there are at least two baffles provided within the chamber and the chamber is composed of at least two plates or faces which sealingly 25 engaged the baffles while the baffles are, nevertheless, slidably retained between said plates.

A magnet or magnets can be imbedded in the baffles to cause the plates, particularly the perforate plate, of 30 the plenum chamber to adhere to the baffles so as to form a chamber of a desired size and shape within the overall plenum chamber as will be more evident when viewing the drawing and its description.

Further, ropes can be attached to the baffles, also as 35 shown and described in connection with the drawing, so that the baffles can be adjusted from outside of the plenum chamber.

As a feature of the invention, there are provided elements within the plenum chamber for pivotably engaging 40 at least one of the ends of the baffles while at the other end pivotably engaging at least one of the ends of the baffles while at the other end pivotably and slidably with respect to the pivots engaging the other ends of the baffles by angularly constructed retaining elements 45 which at all times form a seal against undue air flow from within the baffles except through the perforations in the perforate face of the plenum chamber.

The use of a myriad of air jets forming an air film between the tube or plastic film surface and the collapsing frame aids to lubricate the passage of the plastic tube being collapsed through the collapsing frame and thus importantly aids to eliminate wrinkles which frequently form at the collapsing frame during the extrusion and flattening of blown film. The frame of the 50 invention can be used on any blown line but is especially useful with those plastics which readily tend to present mechanical or other problems such as wrinkling.

In the drawing,

FIG. 1 is an isometric view of the general operation of blowing a film showing the general positioning of the 55 plenum chamber or chambers constituting the collapsing members of the invention.

FIG. 2 is a vertical face view of one of the collapsing frame plenum chamber members with the perforate face or front cover removed so that the inside workings of the baffle members can be seen and described.

FIG. 3 is a vertical view from the end of the frame member in cross-section at the air or cooling medium inlets as more fully described now.

Referring now to FIG. 1, tubular film issues from an extruder through a ring die and extends upwardly between a pair of plenum chambers 1. The plenum chambers 1 are positioned so that the film tube is collapsed without wrinkles before it enters the nip rolls.

Referring to FIG. 2 of the drawings, 2 is a portion of the plenum chamber making up the back plate or closure of the plenum chamber. Air inlets 3 and 4 supply air into the chamber. The chambers are equipped with movable or adjustable baffle members 5 and 6 pivotably hinged at their upper ends at 7 and 8. At their lower ends the baffles are pivotably and slidably engaged in slots 9 and 10 cut into slidably adjustable members 11 and 12 which are mounted in channel 13. Pieces 11 and 12 act to extend the baffles to the bottom of the chamber to avoid loss of air between the baffle bottoms and the chamber bottom. Ropes passing over pulleys 14, 15, 16 and 17, as shown, and attached and fixed, also as shown, are adapted in the assembly to permit adjusting the positions of the top and bottom ends of the respective baffles. As shown at the upper ends, baffles 5 and 6 are slotted to permit the respective ropes to pass therethrough.

The upper ends of the baffles are attached to slidable members or hanger brackets 18 and 19 which are slidably retained in channel 20.

At the lower ends the pivots 21 and 22 of the baffles 30 are biased against the slot walls by leaf springs 23 and 24. These flat leaves also act to seal against air loss between the baffle bottom ends and the pieces 11 and 12.

In the embodiment described the baffles are 35 equipped with magnets 25 and 26 embedded into the surfaces of the baffles to ensure closure contact of the front wall of the plenum chamber and the baffles.

Referring now to FIG. 3, the front cover 30 is perforate at 31. Air enters via 3 and 4 and is spread between baffles 5 and 6 by means of baffle plates 32 and 33 which are held in position by struts 34, 35 and 36, 37 respectively. Baffle plates 32 and 33 can be shaped and so positioned as to ensure a desired flow distribution of air into the plenum that to between the baffles 5 and 6, the chamber to supply air from within the chamber into and through the perforate face onto the tube being collapsed; in the now preferred embodiment the plenum chamber comprising adjustable baffles so as

As evident from the drawing, the ropes extend to

without the plenum chamber at both sides thereof. There are two ropes attached to each end of each baffle so that each end of the baffle can be moved or slid from or toward its respective end of the plenum chamber.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawing and the appended claims to the invention the essence of which is that there has been provided a method for collapsing a blown tube film by passing the same into a collapsing frame and there maintaining a flow of air on the surfaces of the frame and film during the collapsing thereof and that an apparatus or assembly comprising a plenum chamber disposed to cause collapsing of a tube passing adjacent thereto has been provided, the chamber having a perforate face and means within the chamber comprising adjustable baffles so as to be able to adjust the effective face of the plenum chamber facing the tube being collapsed to put substantially all the air onto said tube from said chamber.

I claim:

1. A method for collapsing a blown tube film which comprises passing the same into a collapsing zone, the boundaries of which act to collapse said film and therein maintaining a flow of air on the surfaces of said film facing the boundaries of said zone which act to collapse said film, maintaining the air flow sufficient to lubricate the passage of the film through the collapsing zone, blowing air into through and from a plenum section within said zone onto said surfaces of said film, providing in the inside of said plenum section variably adjustable air flow control elements to allow directing the air flow from variably selectable portions of said plenum section onto said tube film, by adjusting the position of said elements and while the tube is being collapsed adjusting the air flow, to obtain the desired collapsing of said tube, onto said tube film in said zone by adjusting said adjustable air flow control elements inside said plenum section, the adjustable air flow control being adapted to vary the air flow from said plenum section to adjust the effective face of the plenum chamber facing the tube film while it is being collapsed to match the shape and size of said surfaces of said tube film moving through said collapsing zone so as to direct onto said tube film substantially all of the air emanating from said plenum section, thereby matching the shape and size of the tube film being collapsed and the effective face of the plenum chamber each to the other regardless of any variation in the momentary size of the tube film.

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