Oct. 5, 1971 A. R. HUNTER 3,609,951

FUME AND VAPOR COLLECTING APPARATUS FOR FALSE TWISTING MACHINES

Filed Dec. 17, 1969 2 Sheets-Sheet 1

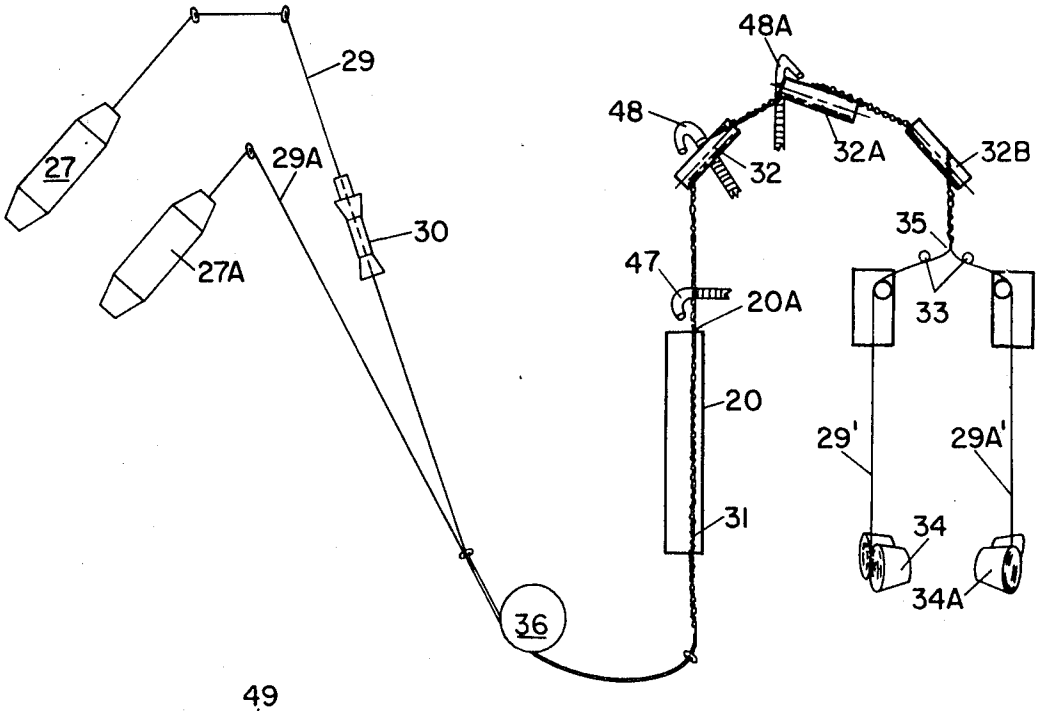


FIG. 1

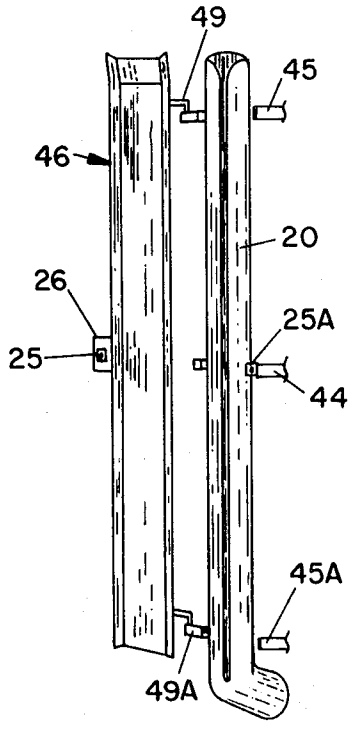


FIG. 3

INVENTOR
A. REESE HUNTER

BY Hunt, Heard & Shaddox

ATTORNEY

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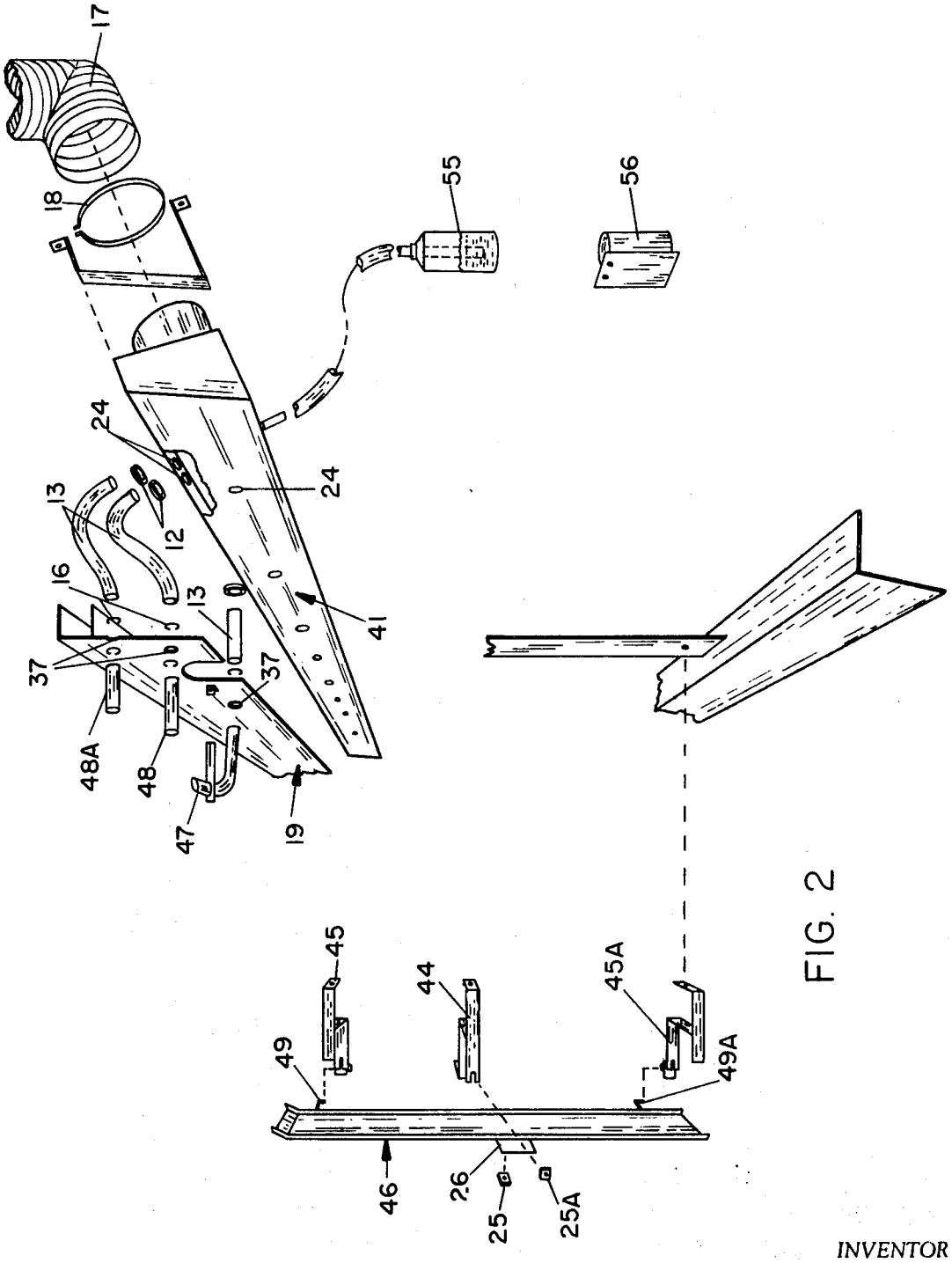


FIG. 2

INVENTOR
A. REESE HUNTER

BY Hunt, Heard & Rhodes

ATTORNEY

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FUME AND VAPOR COLLECTING APPARATUS FOR FALSE TWISTING MACHINES

Allen Reese Hunter, 2624 Woodlyn Way, Greensboro, N.C. 27407

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U.S. Cl. 57—34 7 Claims

ABSTRACT OF THE DISCLOSURE

A suction system including strategically positioned nozzles for collecting fumes and vapors entrapped within a pair of twisted yarns passing through the heat-setting chamber of a false twist machine and released at subsequent processing points due to the flexing and bending of the pair. The system further includes a shield covering the open side of the heat-chamber to prevent escape of the fumes and vapors to the atmosphere.

During the false twist treatment of a synthetic yarn, a pair of yarn strands are first twisted together before delivery to a heat-chamber, where oils, waxes and other additives picked up and carried by the yarn are converted to undesirable fumes, gases and vapors by the heat. Generally, most of these fumes and vapors are released from the surface of the yarn as it passes through the heat-chamber, and it has been suggested to collect these gases at the exit or delivery end of the heat-chamber by the United States Letters Patent No. 3,066,471 to Scragg. Significant quantities of fumes and vapors, however, are trapped internally in small pockets or cavities within each yarn strand and between the twisted pair. This condition arises from the fact that each yarn strand comprises a plurality of filaments twisted together forming fume entrapping pockets, and additionally the strands are further wrapped around each other to form additional pockets therebetween. These internally trapped fumes and vapors are retained by the yarn until it is flexed and bent at subsequent processing stations spaced from the exit end of the heat-setting chamber.

Heat chambers of the type used with conventional false twisting devices include an open side to facilitate threading of the yarn pair during set up of the false twisting machine. The open side leads to difficulties, however, when it is desired to collect the fumes and vapors at the exit or delivery end of the heat chamber as is shown by the Scragg patent, because substantial quantities of the fumes escape through the open side, rather than exiting at the delivery end.

The present invention, on the other hand, is adapted to overcome both of the above-discussed problems by first providing auxiliary suction nozzles adjacent the processing rolls, over which the yarn passes after it leaves the delivery end of the heat chamber, for collecting the entrapped fumes and vapors there released, which would otherwise escape to the atmosphere. A hinged shield is also provided across the open side of the heat chamber to allow access for threading the pair of twisted strands during set up, and yet to prevent escape of the gases therethrough during operation and channel such gases to the delivery end where they are collected by primary suction nozzles.

An object of this invention is to provide an apparatus for the removal of fumes and vapors released by the flexing and bending of a heated pair of twisted yarn strands in a false twisting machine, as well as collecting the fumes and vapors released in the heat chamber of the machine.

Another object of this invention is to provide a shield for the open side of the heat chamber which during operation channels the fumes and vapors to the delivery end

of the heat chamber for removal by a suction nozzle, and which during set up is removed to facilitate threading of the heat chamber.

Another and more specific object of this invention is to provide an apparatus of the type described; further including suction nozzles adjacent yarn flexing rolls spaced from the delivery end of the heat chamber to collect fumes and vapors released from within a pair of twisted yarn strands as it is flexed and bent over said rolls.

Other objects and uses of this invention will become apparent from the detailed description and the accompanying drawings, in which:

FIG. 1 is a schematic view illustrating the flow of a pair of twisted yarn strands through the heat chamber, across the subsequent direction changing rolls, and onto a take up package;

FIG. 2 is an exploded perspective view with parts broken away of the apparatus according to the present invention illustrating the main suction duct and the nozzles leading to one yarn processing station; and

FIG. 3 is a perspective view, with parts broken away, illustrating the shield for the open side of the heat chamber according to the present invention.

Referring now to the drawings, and especially FIG. 1, an exemplary machine with which the present invention is adapted for use comprises a false twist machine of the type wherein each of a plurality of yarn processing stations includes a pair of supply packages **27** and **27***a* from which yarn strands **29** and **29***a* are delivered to tension roll **36** with a predetermined number of twists per inch initially introduced by starter bobbin **30**; a heat chamber **20** through which the pair of twisted strands **31** pass for thermal treatment; a series of directional changing, yarn processing rolls **32**, **32***a* and **32***b* arranged in tandem and spaced from the exit end **20A** of heat chamber **20** and which flex and bend yarn pair **31** through a Z- or S-path before directing the pair through separating rings **33**; and a pair of take up packages **34** and **34***a* to receive the separated and processed yarn strands **29'** and **29A'** from separating rings **33**. The above described apparatus is conventional in the industry and is not within the scope of the subject matter of the present invention. Rather, the present invention includes a fume evacuating means at one or more of rolls **32**, **32***a*, and **32***b* in addition to a well-known nozzle **47** at the exit end of the heat chamber **20**. Additionally, a shield means covers the open side of heat chamber **20** to prevent escape of fumes therethrough and channel the fumes released therein to the delivery end **20A** of the heat chamber where they may be collected by nozzle **47**.

A collection duct **41**, having a central source of suction (not shown) connected thereto and extending longitudinally of the yarn processing machine past each station thereon, is suitably mounted to the frame of the machine on the feed side above the supply package creel so as not to interfere with the flow of yarn therethrough. Flexible conduit **17** connects duct **41** to the source of suction and is attached to duct **41** by clamping ring **18**. At each of the machines' yarn processing stations the collection duct **41** is provided with a plurality of suction inlets **24** in the walls thereof, each inlet having one end of a flexible connection tube **13** attached thereto by some suitable means such as a grommet **12**.

A valance **19** is suitably mounted on the machine and extends longitudinally in parallel spaced relation to duct **41**. A series of openings **37** receive the opposite ends of flexible tube **13** in some suitable manner such as by spring fasteners **16**. Suction nozzles **47**, **48**, and **48***a* are connected to openings **37** at the opposite side of valance **19** from the tube **13** and have the free ends thereof positioned adjacent the fume and vapor evacuation point at the delivery **20A** of heat chamber **20** and adjacent the yarn

processing rolls **32** and **32***a*. It is to be understood that an additional vacuum nozzle might be added to the apparatus at yarn processing point **32***b* if significant quantities of entrapped fumes and vapors are found to be released at this point. Each of the nozzles **47**, **48** and **48***a* are rigidly mounted on valance **19** in a manner permitting adjustment of the respective nozzle tips to an optimum position over the delivery end of heat chamber **20** and at the subsequent processing rolls **32** and **32***a* as needed. Flexible connection tubes **13** connect valance **19** to collection duct **41** eliminating the requirement of precision manufacturing of the nozzles and connecting tubes as one unit and costly adjustments as the suction system is installed.

Shield **46** is pivotally positioned to selectively cover and uncover the open side of heat chamber **20**. One means for so mounting shield **46** includes a plurality of brackets **44**, **45**, and **45***a* having one end thereof mounted to the machine frame and adapted to surround the periphery of heat chamber **20** in slightly spaced relation thereto. Shield **46** is hingedly attached to the free ends of brackets **45** and **45***a* by hinges **49** and **49***a* and is pivotal about a vertical axis between a first, closed position covering the open side of heat chamber **20** and a second open position spaced from the open side. In its closed position, a positively magnetized fastener element **25** mounted on lateral protrusion **26** from shield **46** magnetically engages a negatively magnetized fastener element **25***a* mounted on bracket **44** to retain shield **46** in place. Heat chamber shield **46** in the closed position prevents the undesirable fumes and vapors from escaping through the open front side of heat chamber **20** and, instead, channels them upwardly through the delivery end **20**A to be collected by vacuum nozzle **47**.

In operation and with reference to FIG. 1, supply packages **27** and **27***a* are positioned to furnish two separate strands of synthetic yarn filaments **29** and **29***a* which are subsequently twisted together and delivered through a yarn guide to a tension roll **36**. The twisted pair **31** is then subjected to heat treatment in chamber **20** wherein fumes and vapors are released which are collected by nozzle **47**.

The heat treatment of the twisted pair **31** causes each yarn strand to form a helical spring which remains set in each individual yarn strand after they are subsequently separated. However, in such a tightly twisted condition in heat chamber **20**, the pair of twisted yarn strands, as well as the twisted filaments of each strand, entrap fumes and vapors in internally formed cavities or void spaces. As the pair of twisted yarn strands are flexed and bent over yarn processing rollers **32**, **32***a* and **32***b*, subsequent to heat chamber **20**, the entrapped fumes and vapors are released. Ordinarily the undesirable fumes and vapors would escape into the surrounding work space causing uncomfortable and injurious conditions for the machine operator.

Prior fume and vapor removal systems have failed to recognize the problem of entrapped fumes and vapors and their release at subsequent processing points. The present invention recognizes and solves the problem of entrapped fumes and vapors by positioning additional vacuum nozzles **48** and **48***a* at yarn processing rolls **32** and **32***a*, respectively to remove substantially all of the entrapped gases thereby released. While the figures and disclosures show the positioning of two suction nozzles **48** and **48***a*, one at each of the yarn processing points subsequent to heat chamber **20**, it would not vary from the object and spirit of this invention to alter the number of vacuum nozzles nor the order in which they are arranged at any of the subsequent processing points **32**, **32***a*, **32***b* or separation point **35**.

There is claimed:

1. In a drawing twisting machine of the type including a heat chamber through which a twisted pair of yarn strands are adapted to be processed, subsequent processing points where said twisted pair is adapted to be bent orf flexed, and a primary suction nozzle adjacent the delivery end of said heat chamber, the improvement comprising means for collecting entrapped fumes and vapors released at said subsequent points.

2. The improvement according to claim **1** wherein said means comprises at least one auxiliary suction nozzle positioned adjacent one of said subsequent points.

3. The improvement according to claim **2**, wherein said subsequent processing points include a plurality of yarn processing rolls mounted on said machine at positions intercepting in tandem the yarn strand subsequent to its processing through said heat chamber, said auxiliary suction nozzle being positioned adjacent the first of said yarn processing rolls.

4. The improvement according to claim **3** wherein further auxiliary suction nozzles are positioned adjacent other of said processing rolls.

5. In a draw twisting machine of the type including an elongated heat chamber having an open side through which a twisted pair of yarn strands are adapted to be processed, subsequent processing points where said twisted pair is adapted to be bent or flexed, and a primary suction nozzle positioned adjacent the delivery end of said heat chamber, the improvement comprising the combination of:

(a) means for collecting entrapped fumes and vapors released at said subsequent points; and

(b) a shield covering said open side of said heat chamber for preventing escape of fumes and vapors therethrough and channeling said fumes and vapors to said delivery end of said heat chamber.

6. The improvement according to claim **5** wherein said means comprises at least one auxiliary suction nozzle positioned adjacent one of said subsequent points.

7. The improvement according to claim **5** wherein said shield is mounted for pivotal movement between a closed position covering said open side and an open position allowing access to said heat chamber.

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DONALD E. WATKINS, Primary Examiner

U.S. Cl. X.R.

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