

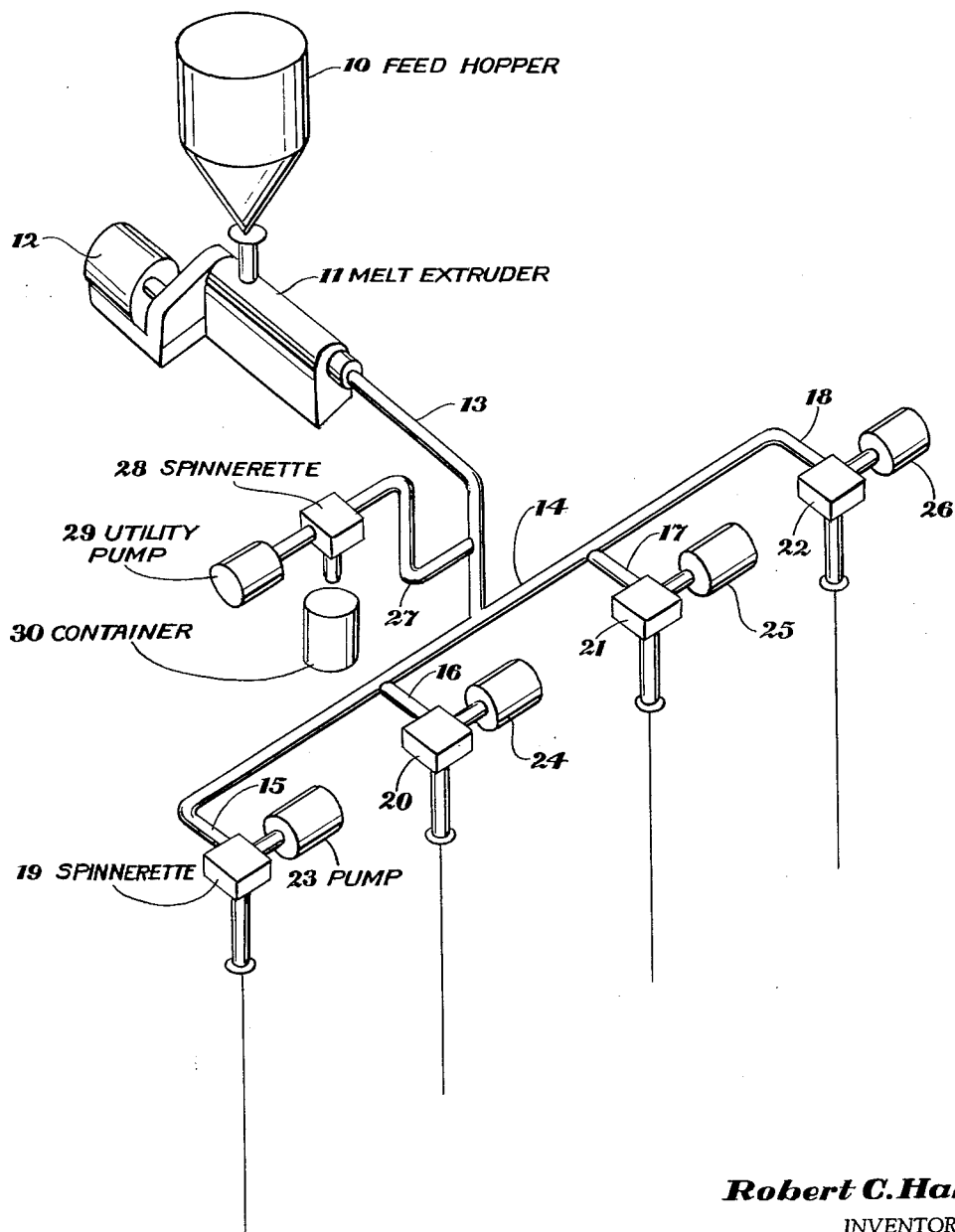
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MELT SPINNING

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1

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MELT SPINNING

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4-Claims. (Cl. 18-8)

This invention relates to melt spinning of textile filaments and more particularly to an improved melt spinning system especially adapted for spinning textile filaments from polyesters.

Polyesters in the melted phase undergo a decrease in intrinsic viscosity with respect to time. To spin filaments of uniform quality it is desirable that all of the material extruded through the spinnerettes be held in the melted phase for a uniform time of short duration.

The usual melt spinning system consists of a melter in which polyester pellets are melted and pumped into a pipe which delivers the liquid polyester to a number of metering pumps from which the polyester is pumped to a spinnerette. There is one metering pump for each spinning position. The metering pump delivers a precise quantity of molten polyester at the necessary pressure to force the polyester through the associated spinnerette.

When one or more of the spinnerettes or other components of a spinning position fails to function properly, the associated metering pump must be stopped with the result that the holdup time in the entire system back to the meter is increased. This additional holdup time causes a decrease in the polyester intrinsic viscosity and other undesirable changes in properties of the filaments being spun from the remaining operable spinnerettes.

It is an object of the present invention to provide an apparatus and method whereby uniform intrinsic viscosity and related properties of the filaments being melt spun from the operable positions are maintained even though one or more of the positions, normally operating, be temporarily inoperable. Other objects will appear hereinafter.

In accordance with the present invention, these and other objects are attained by maintaining a constant molten polyester holdup time independent of the number of spin positions being operated.

A feature of this invention is the provision of an additional metering pump down stream of the melter and upstream of the metering pumps supplying the spinnerettes and adapted to discharge a portion of the molten polyester out of the system, as to a container. This pump will normally be operated at a very low rate with a flow just sufficient to prevent the pump from becoming obstructed with solidified polyester.

In the event one or more spinning positions become inoperable and the melt holdup time tends to increase, this additional metering pump, henceforth termed the utility pump, is operated at a faster rate to keep the flow rate through the melter constant and maintain the constant holdup time essential for close control of filament properties.

My invention will be further understood by reference to the accompanying drawing in which melt spinning apparatus is shown in combination comprising a feed hopper 10, a melt extruder 11, a motor 12 adapted to drive the extruder, pipes 13 to 18 for conducting molten polyester to respective spinnerettes 19 to 22 and pumps 23 to 26 to force the polyester through the respective spinnerettes to form filaments.

Pipe 27 branches from pipe 13 and conducts molten polyester to spinnerette 28 where it is forced therethrough by utility pump 29 to form filaments which are retained in container 30. The pipes 13 to 18 and 27 are preferably heated to maintain the polyester in a melted condition.

2

The operation of my invention is now further described. During normal melt spinning operations, metering pumps 23, 24, 25 and 26 deliver constant metered quantities of molten polyester to their respective spinnerettes. The holdup time of the molten material from the melter to the metering pump and spinnerettes is constant and substantially the same for the four spinning positions.

The utility pump 29, however, is allowed to run at a much slower rate, the rate being just sufficient so that pump 29 and spinnerette 28 will not become obstructed by solidified material.

Now assuming that spinnerette 19 malfunctions and pump 23 must be stopped, it is apparent that the system holdup time from the melter to the spinnerettes is thus increased by 25%.

In such an event, the utility pump 29 is speeded up to reduce the holdup time of the material going to spinnerettes 20, 21 and 22 to exactly the normal time as though all four, instead of three, production spinnerettes were operating.

When the malfunctioning of spinnerette 19 has been restored to working condition, the utility pump 29 is slowed to its normal slow speed, and pump 23 is started. Normal spinning is thus resumed from all four spinnerettes.

The utility pump need not necessarily be a metering pump but could be any kind and any number of metering devices for permitting a known quantity of molten polyester to be extracted from the system for purpose of controlling the holdup time of the molten material.

The utility pump also has other desirable functions. It can serve as a means for obtaining samples of the melted polyester for laboratory analysis or the like.

The utility pump may also be employed to control time dependent properties of the polyester. For example, molten holdup time within the system can be decreased to permit spinning of polyester of initial low intrinsic viscosity. By running the utility pump at the necessary speed and permitting that portion of the polyester passing through the utility pump to go to waste, the remaining material reaching the spinnerettes can be spun with less holdup time in the molten condition than normal and consequently a fiber of normal quality may be obtained from material having an intrinsic viscosity somewhat lower than that normally required. A viscosity sensing device installed in the molten polyester stream in conjunction with a controller varying the utility pump speed could control viscosity at the spinning positions by varying the system holdup time.

The utility pump may also be employed to rid the system of molten material which may be unsuitable for passing through the spinnerettes.

I claim:

1. Apparatus for melt spinning synthetic filaments from a melt spinning composition, comprising in combination, a supply source of melt spinning composition, a plurality of filament-forming spinnerettes, conduit means for conducting the melt spinning composition from the supply source to said spinnerettes, means associated with each spinnerette for forcing the composition therethrough at substantially a constant rate to form filaments, an additional outlet means connected to said conduit means downstream from the supply source and upstream from the filament-forming spinnerettes, means associated with said outlet means adapted during normal spinning operation to force melt spinning composition therethrough and out of the system at a rate substantially less than said constant rate, but adapted to operate at least at said constant rate when any malfunction develops during spinning whereby the holdup time of the spinning composition in the apparatus is maintained constant.

3

2. Apparatus for melt spinning synthetic filaments from a melt spinning composition, comprising in combination, a supply source of melt spinning composition, a plurality of filament-forming spinnerettes, conduit means for conducting the melt spinning composition from the supply source to said spinnerettes, pump means associated with each spinnerette for forcing the composition there-
 10 through at substantially a constant rate to form filaments, an auxiliary spinnerette connected to said conduit means downstream from the supply source and upstream from the filament-forming spinnerettes, and having pump
 15 means associated therewith adapted during normal spinning operation to pump said composition therethrough and out of the system at a rate substantially less than said constant rate but adapted to operate at least at said
 20 constant rate when any of said other spinnerettes malfunction whereby the holdup time of the spinning composition in the apparatus is maintained constant.

3. Apparatus for melt spinning synthetic filaments from a melt spinning composition, comprising in combination, means for melting the composition, a plurality of filament-forming spinnerettes, conduit means for conducting the melted composition from said melting means to said spinnerettes, means for forcing said melted composition through said conduits, pump means associated
 25 with each spinnerette for forcing the composition therethrough at substantially a constant rate to form filaments, an auxiliary spinnerette connected to said conduit means downstream from the melting means and upstream from the filament-forming spinnerettes and having pump means
 30 associated therewith adapted during normal spinning operation to pump said composition therethrough and

4

out of the system at a rate substantially less than said constant rate but adapted to operate at least at said constant rate when any of said other spinnerettes malfunction whereby the holdup time of the spinning composition
 5 in the apparatus is maintained constant.

4. Apparatus for melt spinning synthetic filaments from a melt spinning composition, comprising in combination, a melt extruder, a plurality of filament-forming spinnerettes, a conduit system for connecting the melt extruder with the spinnerettes, a pump associated with each spinnerette adapted to force the spinning composition therethrough at substantially a constant rate to form
 10 filaments, an auxiliary spinnerette connected to said conduit system downstream from the melt extruder and upstream from the filament-forming spinnerettes and having a pump associated therewith adapted during normal
 15 spinning operation to pump said composition therethrough and out of the system at a rate substantially less than said constant rate but adapted to operate at least at said
 20 constant rate when any of said other spinnerettes malfunction whereby the holdup time of the spinning composition in the apparatus is maintained constant.

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