Feb. 17, 1953 J. WHARTON 2,628,885

MANUFACTURE AND PRODUCTION OF ARTIFICIAL THREADS FROM VISCOSE

Filed Jan. 21, 1949 2 SHEETS—SHEET 1

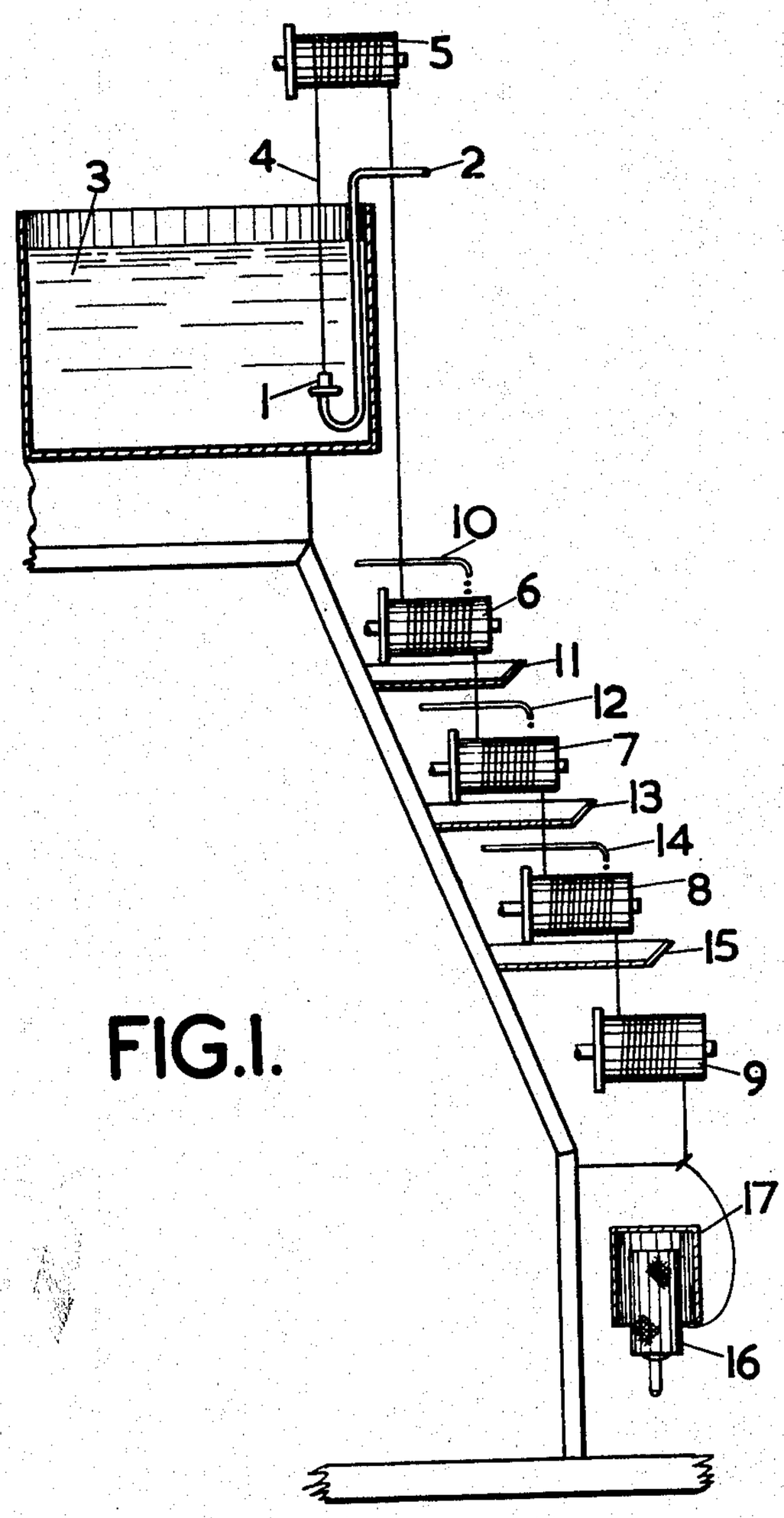

FIG.1.

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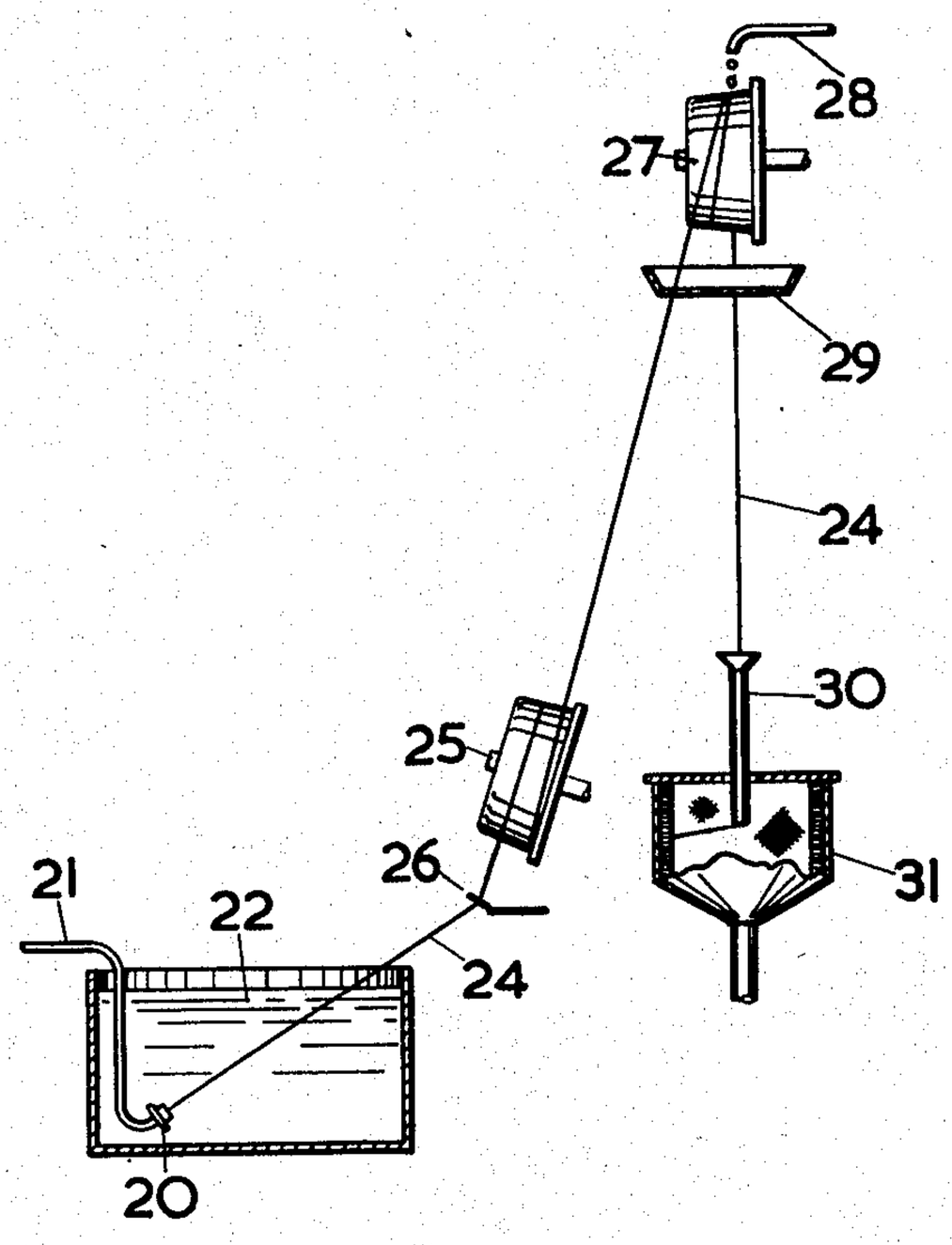

FIG.2.

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UNITED STATES PATENT OFFICE

2,628,885

MANUFACTURE AND PRODUCTION OF ARTIFICIAL THREADS FROM VISCOSE

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In Great Britain February 9, 1948

1 Claim. (Cl. 18—54)

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This invention relates to the manufacture and the production of artificial threads, filaments, yarns and the like, hereinafter referred to as threads, from viscose.

In the production of artificial threads from viscose, viscose is extruded through a jet into a coagulating bath containing sulphuric acid and one or more metallic salts. The threads are withdrawn from the coagulating bath and passed by means of thread guides over one or more godets, or the threads are passed on to one or more thread-advancing reels where they are treated with processing liquids. Insoluble substances are formed by the reactions which take place during the coagulation and subsequent treatment of the threads, and these substances are carried away by the threads and tend to form hard deposits on thread guides, godets and thread-advancing reels. In the specification of U. S. Letters Patent No. 2,394,519, it has already been proposed to extrude viscose into an acidic coagulating liquid containing an emulsified petroleum oil, which is insoluble in the liquid and forms a sludge with impurities in the coagulating liquid and tends to inhibit the formation of harmful deposits not only in and upon the jets but also upon other parts of the apparatus.

The object of the present invention is to improve the production of artificial threads from viscose by preventing the formation of rock-like deposits and incrustations on thread guides, godets or thread-advancing reels.

The present invention consists in a process for the production of artificial threads from viscose wherein the coagulating bath or a processing liquid containing sulphuric acid, one or more metallic salts and an oil, also contains an emulsifying agent for the oil comprising a polyglycol ether obtained by reacting from 2 to 12 mols of ethylene oxide with 1 mol of a long chain fatty alcohol having not less than ten carbon atoms in the chain.

Preferably the polyglycol ether as defined is included in processing liquids applied to the thread after it is drawn from the coagulating bath. Such a processing liquid may contain for example 0.8 per cent to 4 per cent of sulphuric acid, from 1 per cent to 10 per cent of sodium sulphate, from 0.1 per cent to 1.5 per cent of zinc sulphate and from 0.1 per cent to 1 per cent of an oil, the percentages being by weight.

The processing liquid containing the polyglycol ether may be the hot dilute acid bath in which the threads are stretched as described in U. S. specification No. 2,192,074.

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In carrying out the process of the present invention we prefer to use from 2 per cent to 10 per cent by weight of the polyglycol ether on the weight of the oil. The emulsifying agent is preferably dissolved in the oil before addition to the coagulating bath or processing liquid. The oil present in the coagulating bath or processing liquid may be mineral oil, for example, white oil or a vegetable oil, for example, olive oil or cottonseed oil or an animal oil, for example, sperm oil.

Examples of suitable polyglycol ethers which may be used in carrying out the process of the present invention are those prepared by reacting 1 part of lauryl alcohol with 0.6 to 0.8 part of ethylene oxide to give lauryl triglycol ether or by reacting 1 part of cetyl alcohol with 0.8 to 1.0 part of ethylene oxide, or by reacting 1 part of octadecyl alcohol with 1.0 to 1.2 part of ethylene oxide, the parts being by weight.

The emulsifying properties of the polyglycol ethers are found to vary in accordance with the variation in the relative proportions of the two reactants and a series of simple tests will determine the proportions giving a product having the best emulsifying properties under the conditions of use having regard to the acid and salt concentration of the particular coagulating bath or processing liquid in which the polyglycol ether is to be incorporated.

The process of the present invention is applicable to the production of artificial threads from viscose by any of the usual processes. In the centrifugal spinning process in which the thread leaving the spinning bath is passed over one or more godets and collected in a rapidly rotating box, the addition to the coagulating bath containing sulphuric acid, one or more metallic salts and an oil of a polyglycol ether (as defined) prevents the formation of rock-like deposits on the thread guides and godets. Alternatively, or in addition a processing liquid containing sulphuric acid, one or more metallic salts, an oil and a polyglycol ether (as defined) may be dripped onto the thread while it is passing over a godet, a suitable drip-pan being provided to catch the used liquid.

The present invention is of particular value in a continuous spinning process in which the thread after leaving the coagulating bath and without any break is subjected to a series of treatments and to drying and winding onto a package, for example, in a process in which the thread is subjected to treatment with a number of processing liquids while it is passing over one

or more thread-advancing reels. The use of a processing liquid containing sulphuric acid, one or more metallic salts, an oil, and a polyglycol ether (as defined) prevents the formation of rock-like deposits on the thread-advancing reels. The process of the present invention is applicable to all types of continuous spinning machines; and when the process is used the thread guides, reels, rollers and thread-advancing devices on the machine remain substantially free from rock-like deposits which would otherwise collect and have a deleterious action on the thread as well as necessitating frequent and arduous cleaning operations.

The accompanying diagrammatic drawings further illustrate the process of the present invention. Figure 1 represents part of a continuous spinning machine, Figure 2 represents part of a centrifugal spinning machine.

Referring to Figure 1, viscose is extruded through the jet 1 from the supply pipe 2 into the coagulating bath 3 to form a thread 4. The thread leaving the coagulating bath passes up to the thread-advancing device 5 over which it travels in a number of advancing helical turns. On reaching the discharge end of the thread-advancing device 5 the thread falls vertically downward to the second thread-advancing device 6 and again travels in a number of advancing helical turns. A processing liquid containing sulphuric acid, one or more metallic salts, oil and as emulsifying agent a polyglycol ether obtained by reacting 2 to 12 mols of ethylene oxide with 1 mol of a long chain fatty alcohol having not less than ten carbon atoms in the chain is allowed to drip onto the thread travelling on the thread-advancing device 6 by means of the distributor 10; the used processing liquid is collected in the drip pan 11. The thread reaching the discharge end of thread-advancing device 6 passes down onto the thread-advancing device 7 and thence to thread-advancing devices 8 and 9. The thread may be treated with washing, desulphurising, bleaching or other processing liquids while it is travelling on thread-advancing devices 7 and 8 from distributors 12, 14 and the used liquids collected in drip pans 13, 15. The thread-advancing device 9 is supplied internally with steam for heating and so drying the thread. The thread is finally collected on the holder 16 by a cap spinning device 17. Impurities carried over by the thread from the coagulating bath remain in a soft, easily removable condition owing to the processing liquid applied to thread-advancing device 6 and do not form rock-like deposits on thread-advancing devices 6, 7, 8 and 9 or on any other parts of the apparatus.

In Figure 2, viscose is extruded through a jet 20 from supply pipe 21 into the coagulating bath 22 to form the thread 24. The coagulating bath may conveniently contain sulphuric acid, one or more metallic salts, oil and lauryl triglycol ether as emulsifying agent for the oil. The thread leaving the coagulating bath is passed round godet 25 and thread-guide 26 and then passes up to godet 27. A processing liquid conveniently containing sulphuric acid, one or more metallic salts, white oil and lauryl triglycol ether is allowed to drip onto the thread passing over godet 27; the processing liquid is supplied by the distributor 28 and the used liquid is collected in the drip-pan 29. The thread leaving godet 27 passes vertically downwards to the funnel 30 and is collected in the form of a cake in the rapidly rotating box 31. The thread guide 26, godets 25 and 27 and the funnel 30 remain substantially free from hard deposits of impurities.

The polyglycol ethers used as emulsifying agents according to the present invention give optimum emulsification of the oil in the acid and salt coagulating bath or processing liquid and the emulsions obtained remain stable at the concentrations and temperatures used for the spinning and processing of viscose threads.

The process of the present invention is illustrated by the following examples, parts and percentages being by weight:

Example 1

A processing liquid for effecting further coagulation of viscose threads on a thread-advancing reel is prepared by the addition to a bath containing in each litre 2.0 per cent of sulphuric acid, 4.2 per cent of sodium sulphate and 0.5 per cent of zinc sulphate, of 5 grams of mineral oil in which is dissolved 5 per cent of a lauryl polyglycol ether made by condensing 1 part of lauryl alcohol with 0.7 part of ethylene oxide. After thorough mixing, an emulsion is obtained which is stable at all temperatures between 15° centigrade and 80° centigrade. When the emulsion is allowed to drip onto viscose rayon thread passing over a thread-advancing reel, the reel remains free from hard deposits of sulphur impurities.

Example 2

An emulsion suitable for a processing liquid for viscose artificial threads is prepared by the addition to a bath containing in each litre 1 per cent of sulphuric acid, 2.5 per cent of sodium sulphate and 0.1 per cent of zinc sulphate, of 5 per cent of a self-emulsifying mixture comprising approximately 97 per cent mineral oil and 3 per cent of a cetyl polyglycol ether made by condensing 1 part of cetyl alcohol with 1 part of ethylene oxide. The mineral oil emulsion remains stable over a long period. When this emulsion is used for processing viscose rayon thread passing over a thread-advancing reel, the reel remains free from hard deposits of sulphur impurities.

What I claim is:

A process for the production of artificial threads from viscose including the step of subjecting the thread after it leaves the coagulating bath to the action of an aqueous solution containing 2% of sulphuric acid, 4.2% of sodium sulphate, 0.5% of zinc sulphate and 5 grams per litre of solution of mineral oil in which is dissolved 5% of a lauryl polyglycol ether made by condensing 1 part of lauryl alcohol with 0.7 part of ethylene oxide, whereby the formation of harmful deposits on the parts of the apparatus with which the thread comes into contact after leaving the coagulating bath is prevented.

JOHN WHARTON.

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The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
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2,394,519	Kline et al.	Feb. 5, 1946

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Number	Country	Date
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