Nov. 1, 1938. P. KAPLAN 2,135,081

SOAKING SILK YARNS

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Fig. 1.

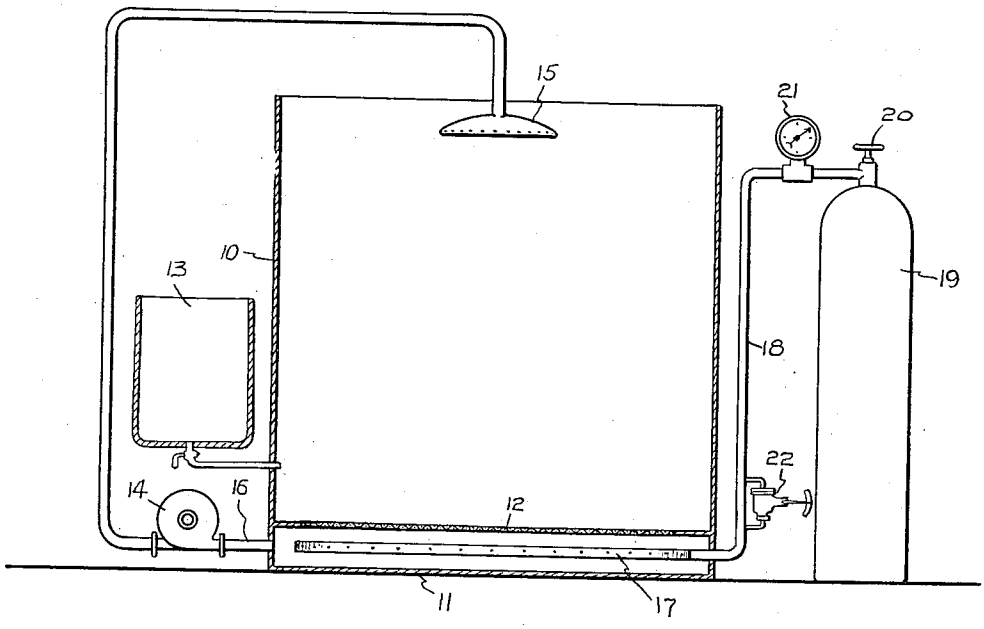
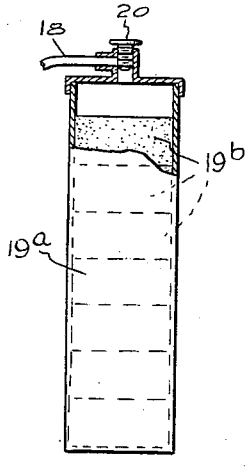


Fig. 2.



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SOAKING SILK YARNS

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2 Claims. (Cl. 28—60)

My invention relates generally to the process of throwing silk and is more specifically directed to that phase of the throwing process in which silk yarns are subjected to soaking in preparation for knitting and weaving. The purpose of soaking silk for throwing is to impart lubricity, pliability and hygroscopicity so that the yarn is suitable for subsequent operations of twisting, doubling, coning and thereafter the further steps of weaving and knitting.

Heretofore this soaking operation has been accomplished by the use of various types of oils and emulsions with or without soap and alkalies. The oil used to make the emulsions usually consists of sulphated oils, or mixtures of sulphated oils and neutral oils; or sulphated oils, neutral oils and mineral oils. This soaking may also be made by emulsifying neutral oils, mineral oils or mixtures of them with soaps or they may be mixtures of sulphated oils, naphthenic soaps or so-called mahogany soap or fatty alcohols. In fact, many combinations of many of the above have been used in the past for making up these soaking baths.

A typical example of soaking procedure is the soaking of 100 pounds of silk in the skein in a solution containing 18 pounds of a suitable oil emulsion together with about 2 to 3 pounds of a mixture of sodium carbonate and sodium bicarbonate. After the oil is brought into emulsion in this alkaline water the bath is warmed to 85° C., the silk is immersed therein and allowed to stand overnight. The silk is then taken out, hydro-extracted and dried, and is thus ready for mechanical operations. Sometimes the bath is equipped with a circulating pump by which the soaking liquor is continuously circulated, in which case the time element is reduced. During the soaking operation there is a decrease in the pH of the bath and a displacement of the oil from the bath onto the silk yarn takes place.

It is desirable to completely displace the entire or substantially the entire oil content of the soaking bath onto the silk and the principal object of my invention is to accomplish this result. This feature is desired since it enables the operator to measure the actual amount of oil deposited and absorbed by the fiber. It also enables the operator to operate at a reduced cost since there is very little residual oil in the bath which is usually discarded after use.

To accomplish the object of my invention I introduce CO_2 gas into the bath during the period of the soaking of the silk. There is, therefore, a double feature involved in my invention; first, the displacement of nearly all of the oil used in the soaking operation and, secondly, the reduction of time. I have found that instead of the usual 12 to 24 hours required for soaking, the time can be, by use of my method, reduced to about 2 to 3 hours.

In practicing my invention I preferably bubble the CO_2 through the bath at the bottom by means of a perforated pipe thereby diffusing the CO_2 at many points simultaneously.

I may apply the CO_2 in any of several ways, as for example I may attach a cylinder of compressed CO_2 to the distributing or diffusing coil and regulate the discharge of CO_2 into the bath by means of valves and through meters measure the amount of CO_2 released. The amount of CO_2 required is dependent upon several factors now employed in the soaking of silk. It is customary to use a mixture of carbonates and bicarbonates in making up the soaking bath, and naturally the greater the quantity of bicarbonates used the smaller is the amount of CO_2 necessary to accomplish my results.

The CO_2 is released in a regular and continuous stream until a drop in pH of the soaking bath is observed. Usually the bath is made up to a pH of 10.3 and when the pH is observed to have dropped to 9.0 to 9.3 the CO_2 is discontinued and the silk is ready for hydro-extraction and subsequent operations. This takes about 2 to 3 hours.

Another means of operating my invention is to provide a closed chamber, in which can be placed a cube of dry ice. This chamber is connected by means of a valve controlled pipe to the inlet of the diffuser. As the dry ice evaporates and expands the CO_2 is forced through this pipe into the liquid of the soaking bath. The evaporation of the CO_2 may be assisted by placing this generator in a warm place. By means of dry ice an exact quantity of CO_2 can be generated by weighing the dry ice before placing it into the chamber.

My invention does not preclude or eliminate the use of auxiliaries in the soaking bath which are used for the purpose of imparting mildew resistance, and other compounds such as glycerine, sodium lactate or any of the usual compounds now being used.

Of the many forms of apparatus which may be used in the practical operation of my invention, I have shown two such forms purely diagrammatically in Figs. 1 and 2 of the accompanying drawing.

In Fig. 1, the chamber for receiving the soak-

ing bath is denoted 10, having a permanent bottom 11 and a false, perforated bottom 12 which may desirably be made of wire cloth. Adjacent the chamber 10 is a tank or chamber 13 containing the initial supply of soaking liquid. The liquid is circulated by a pump 14 and enters the chamber 10 through the head 15, returning to the tank through the pipe 16. Arranged between the bottoms 11 and 12 is a diffuser or distributor 17, preferably in the form of a flat, perforated coil or pipe, connected through the conduit 18 with the CO_2 cylinder 19 provided with the valve 20. The pipe 18 is desirably provided with a gauge 21 to indicate the gas pressure and with a flow meter 22 to indicate the rate of gas flow from the cylinder to the chamber 10.

Fig. 2 is like Fig. 1, except that in lieu of the cylinder 19 of Fig. 1 I use a chamber 19*a* for the reception of a cube or cubes of dry ice 19*b* which gives off CO_2 gas that passes to the tank 20.

It will be understood that my invention is not limited to the use of any particular type of apparatus and that any apparatus may be used which is best suited to the conditions under which the soaking phase is performed.

I claim:

1. In the process of soaking silk submerged in a bath containing oil for throwing purposes, the step of bubbling CO_2 through the soaking bath whereby said CO_2 acts on said oil and rapidly transfers substantially the entire quantity thereof from the bath to the silk.

2. In the process of soaking silk submerged in a bath containing oil for throwing purposes, the steps of bubbling CO_2 through the soaking bath whereby said CO_2 acts on said oil and rapidly transfers substantially the entire quantity thereof from the bath to the silk and discontinuing the introduction of CO_2 when a predetermined decrease in the pH value of the soaking bath has been attained.

PHILIP KAPLAN.