Feb. 24, 1942. W. J. GRIFFITHS 2,274,542

REED-FORMING DEVICE

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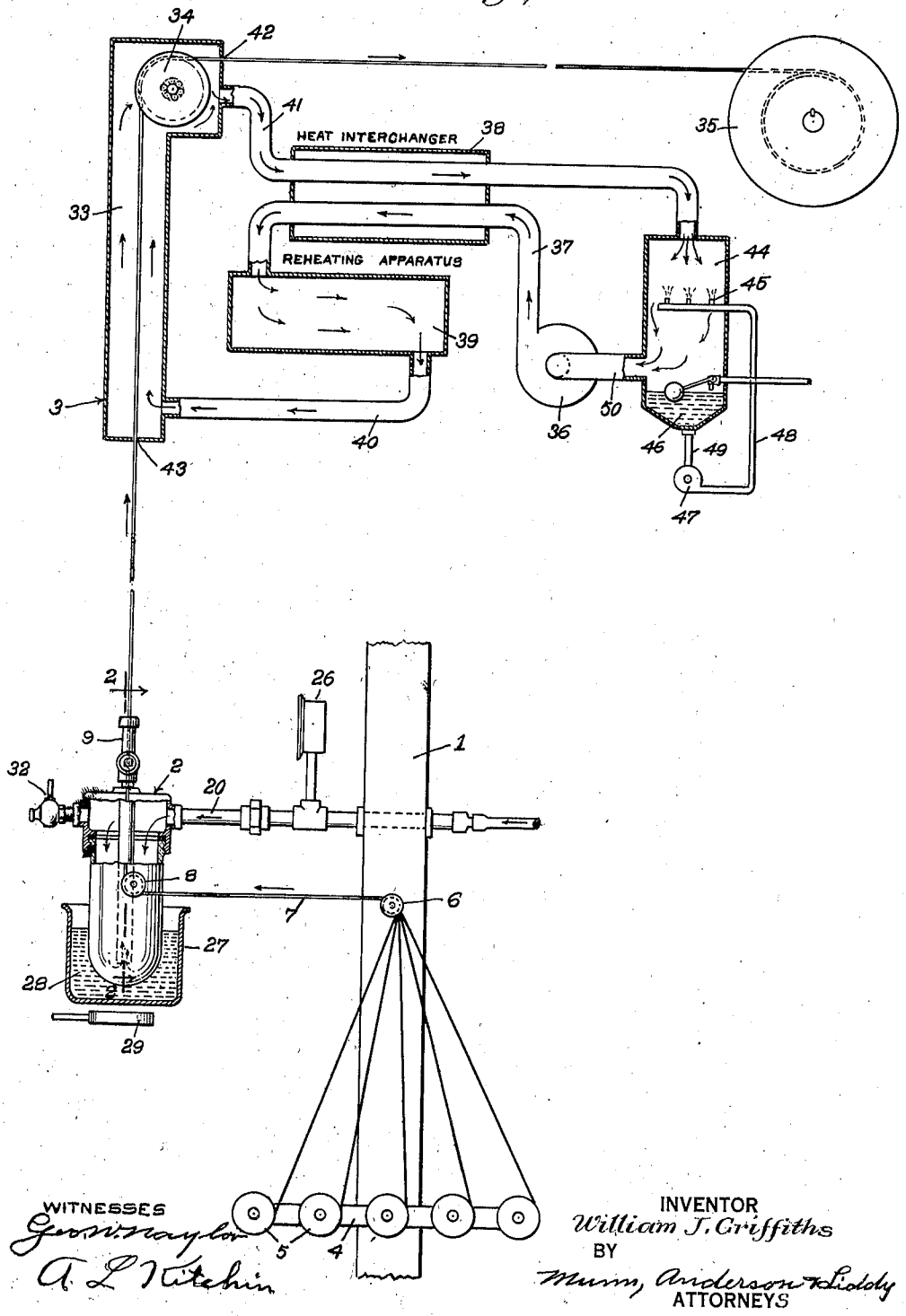
Fig. 1.



WITNESSES

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Fig. 2.

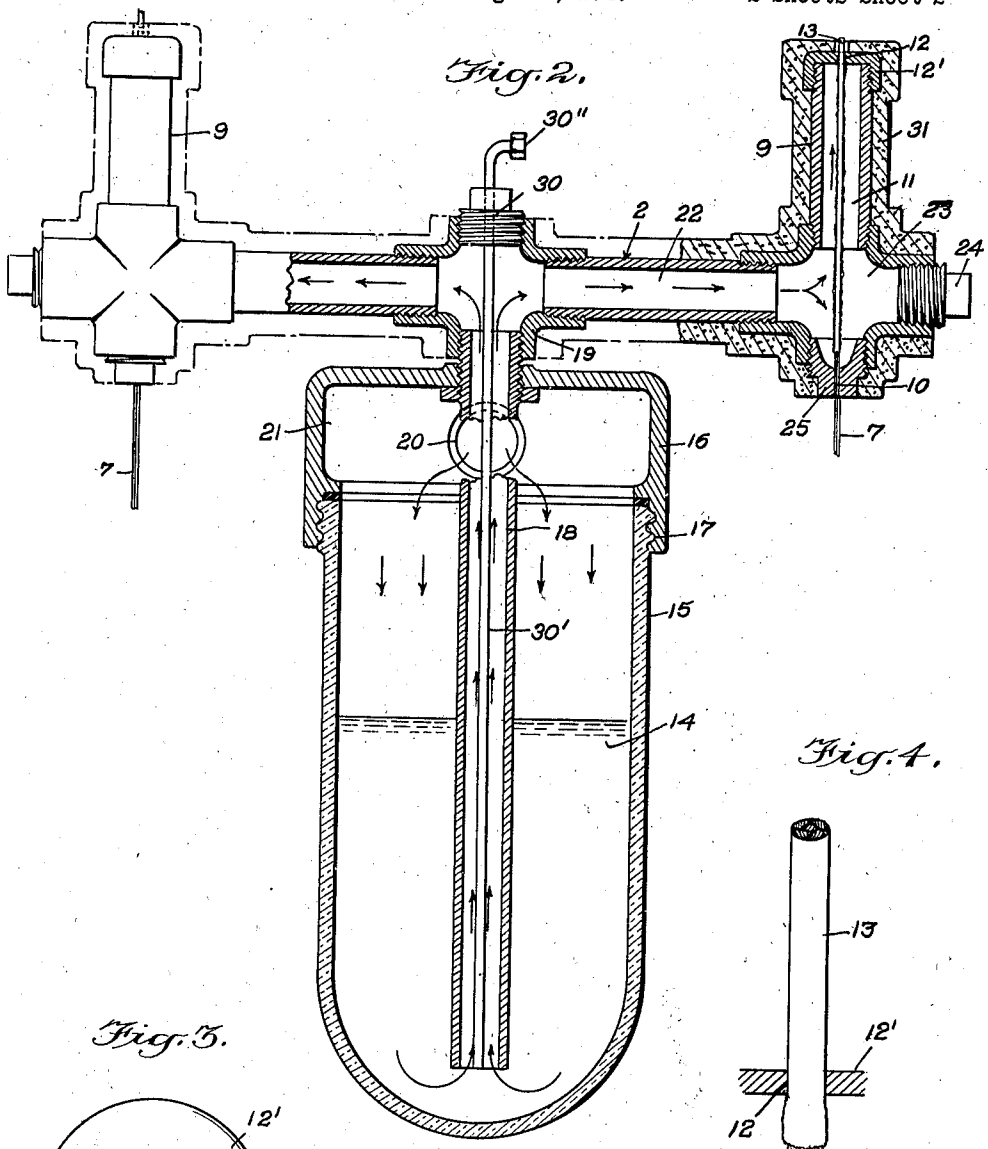
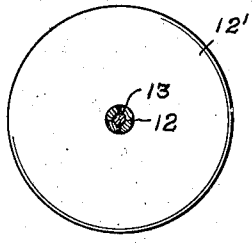


Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE

2,274,542

REED-FORMING DEVICE

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Application August 17, 1940, Serial No. 353,139

1 Claim. (Cl. 91—46)

This invention relates to an improved reed-forming device and a method of producing a reed adapted to be used in sweat-bands and elsewhere, an object being to provide a method and construction which are both simple and which function to quickly secure a strong reed from various fibrous materials.

Another object of the invention is to provide a reed-forming device wherein silk floss, silk yarn, or other fibrous material is subjected to an impregnating solution under pressure as it moves from one point to another.

Another object of the invention is to provide an improved reed-forming device wherein there is provided an impregnating chamber through which strands of fibrous material are pulled and into which is forced an impregnating compound or solution to be applied to the fibrous material as it passes through the chamber.

An additional object of the invention is to provide a construction for forming reeds from silk floss, yarn, or the like which includes a construction for not only applying the proper impregnating solution to the fiber but providing means for maintaining the solution heated and also maintaining the solution under pressure during the impregnating action.

In the accompanying drawings—

Fig. 1 is a view partly in section and partly in elevation showing a reed-forming device embodying the invention;

Fig. 2 is an enlarged view partly in elevation and partly in section showing a pair of impregnating chambers and means for supplying heated solution thereto;

Fig. 3 is a fragmentary top plan view showing the top of one impregnating chamber;

Fig. 4 is a fragmentary view partly in section and partly in elevation showing how the impregnated fibers are formed into a reed as they leave the impregnating chamber.

Referring to the accompanying drawings by numerals, 1 indicates a frame or support of any desired kind and 2 a structure for supplying heated impregnating solution to the yarn or silk. As shown in Fig. 1, there is a heating and drying structure 3 arranged above the structure 2. The heating and drying structure 3 may be used or may be eliminated but where it is used the finished fiber may be dried or set in a much shorter time. The frame 1 supports a bar 4 on which a number of spools 5 of silk floss, cotton, linen, ramie, or other fibrous material are mounted. A yarn from each spool 5 passes over a guiding pulley 6 so as to form a nested strand 7 passing over a second pulley 8. From pulley 8 the strand 7 passes upwardly through the impregnating device 9, then through the device 3 if the same is being used.

As shown in Fig. 2, the structure 2 is provided with two impregnating devices 9, but if desired only one could be used or more than two. However, where more than one is used, there is a separate strand 7 fed into each impregnating device. As shown at the right in Fig. 2, the strand 7 passes upwardly through an opening 10, which may be of any desired shape in cross section. The strand then passes through a chamber 11 and finally out an orifice 12, which, as shown in Fig. 3 is round so that the finished reed 13 is round in cross section. If the orifice 12 were oval, square or some other shape the reed 13 would naturally take the shape of the orifice.

While the strands of fibrous material are passing through the chamber 11, some of the impregnating solution or compound 14 is taken up by the fibrous material and, in fact, is forced therein by reason of the pressure in the chamber. This pressure may vary from a few pounds per square inch to twenty-five or fifty pounds per square inch, though ordinarily a few pounds is sufficient. As the strand 7 moves upwardly through the orifice 10, little or none of the impregnating solution will pass through this orifice and if any should exude through the orifice 12 independently of the reed 13, the same will merely flow laterally and then downwardly over the outside of the device 9.

The solution or compound 14 as shown in Fig. 2, may be formed of various ingredients to be sufficiently liquid and sufficiently thin and tacky to penetrate between and adhere to the fibers of the strand 7. Also the solution must possess the property of quick setting after leaving the impregnating chamber 11. The solution 14 may be a liquid solution of gelatine, gum (resin), wax, varnish, lacquer, pyroxylin, or any desired cellulose base having the properties above mentioned. In regard to the fiber used, any animal or vegetable fiber not repellent to the compound or solution 14 may be employed. So far, silk has been found to produce a superior reed product where strength is an important factor.

If the structure 3 is not used, after the reed leaves the orifice 12 it is carried upwardly a proper distance to permit sufficient time for the impregnating solution to set and harden in order to bend and pass over pulleys, drums, or the like without flattening or becoming distorted.

The solution 14 is positioned in a container 15, which is preferably glass so that the action of the solution may be readily seen. However, other material may be used without departing from the spirit of the invention. As illustrated in Fig. 2, the upper end of the container 15 is screwed into the metal cap 16 at 17 and cap 16, in turn, is threaded on to a metal pipe 18. Pipe 18, at its upper end, is screwed on to a fitting 19 and is so proportioned that the lower end will be

slightly above the bottom of the container 15. An air supply 20 is connected to cap 16 to supply air to the chamber 21 which is in free communication with the upper part of the container 15, whereby when air is supplied from any suitable source there will be a downward pressure on the solution 14, so that it will have a tendency to move upwardly through pipe 18 into the interior of fitting 19 and then through pipe 22 to a fitting 23 and from fitting 23 into chamber 11. A clean-out plug 24 is carried by the fitting 23. Also it will be seen that the plug in which the orifice 10 is formed may be removed so that plugs having different sizes and shapes of orifices may be substituted at any time. The cap 12' with orifice 12 is threaded on the upper end of the impregnating device 9, so that this may be removed at any time and a new one substituted either with the same shaped orifice or a differently shaped orifice. As shown in Fig. 1, there is provided an air gage 26, so that the operator may at any time regulate the air pressure and, consequently, the pressure in the chamber 11.

Most of the ingredients used for impregnating the fibers require heat to make them flow properly and also make them properly impregnate the strand 7. In order to secure the desired heat without injuring the solution 14, a container 27, as shown in Fig. 1, is provided. This container is supplied with water 28 in which the lower part of the container is submerged. A heater using gas or electric current is arranged beneath the container 27 so that the water therein is adapted to be maintained heated, preferably below the boiling point. A temperature of 175° F. has been found to be satisfactory, but a higher or even a lower temperature may be used to maintain the solution 14 in the proper liquid and somewhat tacky condition.

It will be understood that while the description of the impregnating device 9 and associate parts refers particularly to the right-hand device shown in Fig. 2, the description will apply equally to the left-hand impregnating device and to any other devices that might be used as the impregnating solution will radiate from the interior of the fitting 19 into each of the chambers 11 and, consequently, all the chambers will have the same pressure. If it should be found that an undesirable quantity of the impregnating solution in exuding through the aperture or orifice 12, the air pressure may be reduced or the speed increased until this ceases. One yarn from each of the spools 5 is used in Fig. 1, but it will be evident that more or even less yarns of fibers could be used to form the strand 7, without departing from the spirit of the invention. In actual use as many as fourteen single ends or strands of fibrous material of eleven hundred and fifty yards to the ounce have been pulled through the impregnating chamber at the same time. Also where the water 28 is maintained near the boiling point, the strand 7 may be pulled through the impregnating chamber at a rate of approximately three hundred feet per hour. Usually when the arrangement shown in Fig. 2 is used a sufficient quantity of solution 14 is placed in the container 15 through the fitting 19 upon the removal of the plug 30.

The quantity of solution mentioned is adapted to impregnate all the yarn or silk floss on the various spools 5. Where the operation is to be continuous, a small pipe 30' should extend through the plug 30 to the bottom of pipe 18 and a refilling connection 30'' applied to the upper end thereof so that more solution may be added without stopping the operation of the machine.

As it is very desirable and in many cases necessary that the solution be at a higher temperature than the atmosphere of the room in which the device is positioned, a heat-insulating cover 31 is provided for the various devices 9 and connecting piping so that there will be no appreciable chilling action as the fluid flows into these members. Sometimes it may be necessary to remove the container 15 in order to clean out the various parts and when this is required the air pressure is turned off and the pet cock 32 is opened to exhaust the system. The parts may then be unscrewed, cleaned, and if necessary, repaired and then reassembled.

Where desired the drying apparatus 3 may be used. This structure includes a drying chamber 33 having a guiding pulley 34 guiding the reed during the drying action. From pulley 34 the reed extends out into the atmosphere and may be wound around a drum 35 which functions to pull the reed and eventually pull the strand 7. Where the device 3 is not used, the pulling drum 35 must be set at some appreciable distance away from the chamber 9 to give the solution a chance to dry and harden before the reed is wound on the drum. As shown at the upper part of Fig. 1, a blower 36 forces the air to circulate and forces the air into the pipe 37 which passes through the heat interchanging apparatus 38. The pipe 37 discharges into a chamber 39 which is adapted to be heated by a separate heating medium which may be electricity or other heating means. From chamber 39 the heated air passes through pipe 40 into chamber 33 and then into the return pipe 41, except what little may escape through the orifices 42 and 43. Air passing through the return pipe 41 discharges into a moistening chamber 44 where several water sprays 45 are provided. A supply of water 46 is provided in the bottom of chamber 44 and water pump 47, and the respective pipes 48 and 49 form a circulating system for the water. As air enters chamber 44 it is washed by this spray of water and then passes through pipe 50 into the blower 36. While the device 3 is desirable for accelerating the hardening and setting of the impregnating solution, it could be eliminated if desired.

I claim:

A device of the character described comprising an impregnating solution container open at the top, a hollow cap secured to the top of said container and arranged to be in full communication therewith, means for directing fluid under pressure into said cap and container, a pipe connected to said cap and extending therethrough to near the bottom of the interior of said container, a vertically arranged tubular impregnating chamber having an inlet and an outlet orifice at the bottom and top respectively in alignment for the passage of fibrous strands through said impregnating chamber, means for pulling fibrous strands through said chamber so that the strands will travel vertically, and conduit means connecting the upper end of said pipe and the bottom part of said impregnating chamber, whereby when the device is functioning impregnating solution from said container will be delivered to the impregnation chamber under pressure.

WILLIAM J. GRIFFITHS.