April 1, 1930. O. OHLSON 1,752,689

METHOD AND TOOL FOR CLEANING SPINNERETS

Filed June 17, 1925

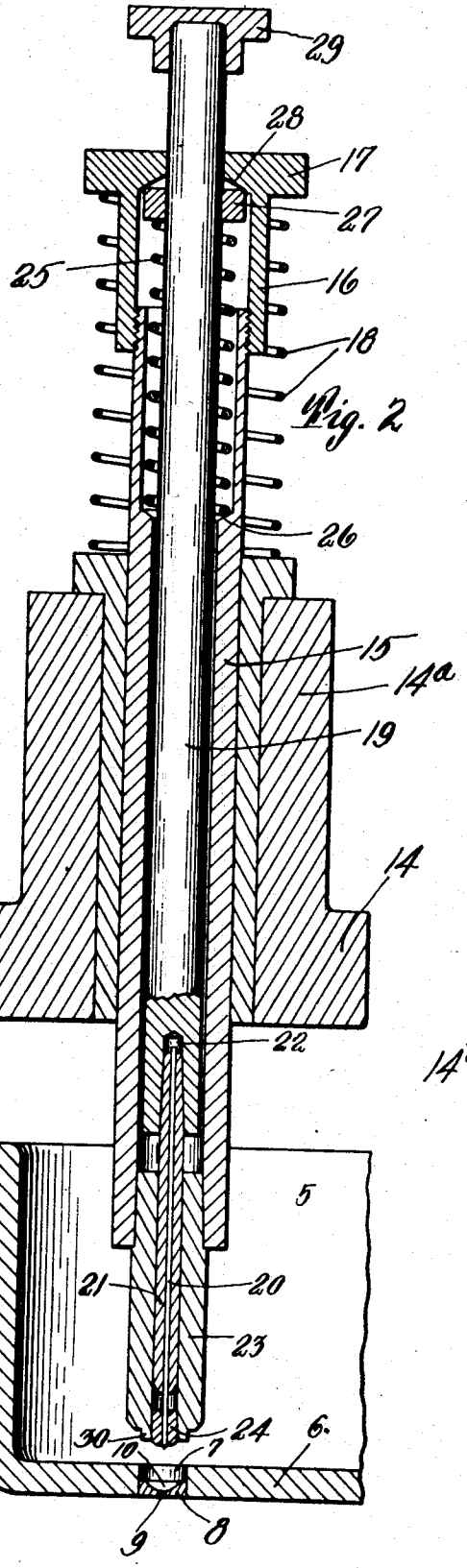

Fig. 2

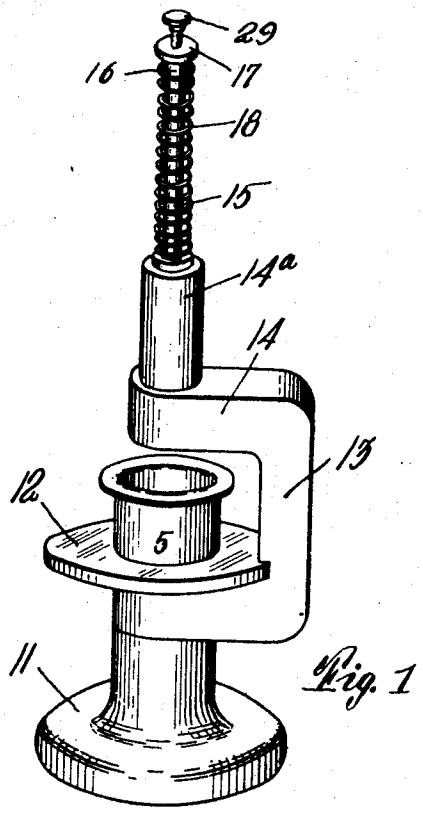

Fig. 1

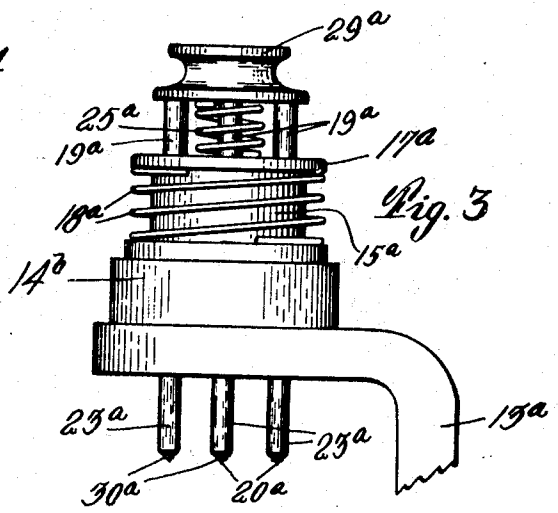

Fig. 3

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Patented Apr. 1, 1930

1,752,689

UNITED STATES PATENT OFFICE

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METHOD AND TOOL FOR CLEANING SPINNERETS

Application filed June 17, 1925. Serial No. 37,761.

This invention is concerned with apparatus or means for artificially forming filaments for textile and other purposes, such as are used in the artificial silk industry, for instance. The means used for making such filaments include devices called spinnerets having minute orifices through which liquid is forced and from which it emerges in fine streams. Such streams coming into contact with a surrounding cooling or coagulating medium are hardened into hair-like filaments. One such device for making such filaments is disclosed in my prior Patent No. 1,337,258, dated April 20, 1920. It comprises a cup adapted to hold the fluid material from which the filaments are formed, and in the bottom of the cup are holes in which are set thin orifice plates having minute holes through them; such cup with its orifice plates forming the spinneret.

The orifices are liable to become stopped up or reduced in diameter by drying or hardening of the liquid around their rims. The primary purpose and object of this invention is to provide a means for easily and rapidly opening the stopped or partially occluded spinneret holes to the full predetermined diameter. Heretofore the cleaning of spinneret holes has been accomplished only with difficulty owing to difficulty in finding the hole in the orifice plate and centering the cleaning tool so that it would pass through the hole without bearing unevenly at one side and cutting or wearing away the boundary of the hole, or being itself broken or deformed.

My invention comprises a tool adapted to center the cleaning implement with the hole, and to be manipulated to that end, and the cleaning implement then passed through the hole, in what amounts practically to a single motion. The invention further embraces the method performed in cleaning spinnerets with the aid of such tool. The nature of the invention and the particular characteristics of construction, operation and manipulation in which it consists can best be set forth in connection with a detailed description of a specific embodiment or example thereof. Such a detailed description is hereinafter given in connection with drawings, as follows:

In the drawings:

Figure 1 is a side elevation of a complete tool embodying my invention and having a single cleaning instrument, the same view showing also, in section, a filament forming device, corresponding to my prior patent aforesaid, in position to be cleaned;

Fig. 2 is a sectional view on a much enlarged scale of the operating part of the cleaning tool in coaction with a spinneret;

Fig. 3 is a view generally similar to Fig. 1 showing a modification of the invention which comprises the provision of a number of cleaning implements arranged and adapted to pass through all, or a number, of the spinneret orifices at once.

Like reference characters designate the same parts wherever they occur in all the figures.

I will first briefly call attention to the characteristic features of the spinner, or filament forming device. Such device comprises a cup 5 adapted to hold the liquid of which the filaments are to be made. In the bottom wall 6 of this cup are holes 7 in which are set the orifice plates 8, the latter being thin disks or bushings, each having a minute short passageway 9 in its center and an enlarged recess 10 in its upper side sloping inward toward the passage 9. The preferred construction of such plate is shown clearly on an enlarged scale in Figure 2. It is preferably made of a platinum gold alloy, such alloy being inert to the action of the fluids to which it is exposed, and also sufficiently tough and hard for the purpose. Other materials having these qualities in sufficient measure may be used however. The plates may be secured with sufficient firmness in their holes by friction, but they also may be otherwise secured.

A feature to be noted in this connection is that the plate is so placed that its upper face is below the upper end of the hole 7 in the bottom of the cup. Thus the upper end of such hole forms an open cavity in the bottom of the cup leading to the spinneret orifice. This cavity is an important factor in

connection with the operation of the cleaning tool, as will presently appear.

The cleaning tool as a whole comprises a base 11 adapted to rest on a table or bench or any other suitable support and having a table 12 to hold the spinneret. At one side of the table 12 is a gooseneck 43 rising from the base and including an overhanging arm 14 from which rises a guiding sleeve 14ª. The base, gooseneck and sleeve may be made as one integral structure; a casting or a forging for instance.

There is a passageway in the sleeve 14ª and through the arm 14, in line with which is an opening in the table 12 and base 11. A tubular plunger 15 is mounted in the sleeve 13, as in a guide, and fits closely therein but with sufficient freedom for easy endwise movement. It is provided at its upper end with a head 16 having a flange 17, which flange forms an abutment for a spring 18 surrounding the plunger and resting on the upper end of the guide sleeve 13, thus normally holding the plunger in raised position and withdrawn from the table.

As shown in large detail in Figure 2, there is within the tubular plunger 15, an inner plunger rod 19 which carries, protruding from its lower end, the cleaning implement 20. The latter is a rod or wire, preferably made of steel, hardened and tempered, and of a diameter to fit closely but without binding, in the spinneret orifice 9. The diameter of this implement is of the order of magnitude from two one-thousandths to four one-thousandths of an inch, or thereabout, depending on the size of the filament which the spinneret is designed to produce; that is about the diameter of a human hair.

The means for mounting, centering, guiding and protecting an implement of such delicacy constitutes one of the features of the invention. It is encased throughout the greater part of its length in a sheath 21 which fits closely about the implement and is tapered at one end to fit a tapered socket 22 in the end of the plunger 19. The sheath 21 is large enough to be stiff and rugged, and it is also elastically compressible. These qualities enable it to be forced into the tapered socket until it is not only firmly secured by friction in the socket, but is pressed upon and grips the cleaning implement. As the passage in the sheath for the cleaning tool is accurately located in its central line, and the tapered end of the sheath is accurately centered with respect to the axis of the plunger, the sheath forms a very simple means for accurately centering and securely fastening the cleaning implement to the plunger.

A guide for the sheath is provided in the form of a tube or bushing 23 set into the lower end of the tubular plunger 15 and having a bore which forms a closely fitting guideway for the sheath. In the outer end of this bore is secured frictionally a bushing 24 having a guideway to receive and aline the short protruding end of the cleaning implement. The various parts last described may be made of any suitable materials. For example, I prefer to make the tubular plunger 15 of brass tubing, the inner plunger 19 of steel, and the sheath 21 as a drawn or seamed tube of brass or bronze composition.

A spring 25 surrounds the inner plunger between an abutment 26 in the bore of the tubular plunger 15, and a collar 27 on the inner plunger, and normally raises such plunger until the collar abuts against a shoulder 28 in the cap 16. When the inner plunger is thus raised the cleaning tool is withdrawn until its end is substantially flush with the bushing 24. The upper end of the inner plunger projects above the cap 16 and carries a head 29 adapted to receive the pressure of the operator's finger. The spring 25 is preferably stiffer than the spring 18, whereby spring 25 is effective as a means for depressing the tubular plunger through pressure exerted by the operator on the head 29.

The lower extremity of the guide tube 23 is reduced in diameter to form an extension 30, concentric with the cleaning implement 20, and the outer diameter of which is adapted to fit closely in the hole 7 containing the plate and the end of which is beveled so that it will readily find an entrance into such hole.

In the use of this tool to clean spinneret orifices, the spinneret is placed on the table 12, resting loosely thereon, and is shifted over the table by the operator until one of the holes in its bottom is approximately in line with the plunger. The operator, by pressing downward on the plunger head 29, depresses both the inner and outer plungers at once, until the projection 30 enters the hole in the spinner cup. Thereby the orifice in the spinneret is alined with the cleaning implement. Additional pressure exerted on the head 29 then protrudes the cleaning implement through the spinneret orifice, thus accomplishing the end for which the tool is designed. Of course, if desired, the first action of depressing the outer plunger to find the hole in the cup bottom may be performed by pressure applied to the cap 16 beside the inner plunger; but with the construction here disclosed it is possible to center and clear the spinneret orifice with a single motion of the finger applied to the plunger head 29.

It will be noted that the tool embodying this invention is simple, and yet guides and alines the cleaning implement accurately, and protects it perfectly. The guiding members of the plunger, comprised by the tube 15, cap 16, and sleeve 23 are sufficiently rugged for the purposes in view, and are firmly mounted and accurately guided in the long sleeve part of the base. Then the sheath 21 of the clean-

ing tool has a long bearing in the sleeve 23. wherein it is protected and accurately guided, and finally the protruding end of the hairlike cleaning member itself is accurately guided and protected by the terminal bushing 24. An equally important protection is given by means of the sheath to the cleaning member 20 when the latter is mounted in the plunger, for the implement itself may be placed in the sheath without exertion or force, while the sheath is rigid enough to sustain without injury the force needed to set it firmly in the tapered socket in the plunger.

The same invention may be embodied in a tool adapted for cleaning all the orifices of a filament forming device, or several orifices, at the same time, instead of one at a time. Figure 3 shows a multiple tool for that purpose. In this case the guide 14^b is relatively larger than the guide 13 first shown and contains a main plunger 15^a, substantially like the plunger 15 except that it contains and guides a number of inner plungers 19^a corresponding in number, spacing, and arrangement, to the orifices which are to be cleaned all at one time. Springs 25^a serve the same purpose as the spring 25. A single knob or head 29^a is engaged with all of the inner plungers 19^a and is operable to move them in unison. In other respects including the details of the individual plungers, cleaning implements and their guiding means, the multiple implement tool is the same as the single implement tool already described in detail.

What I claim and desire to secure by Letters Patent is:

1. The method of cleaning the spinning orifice in a device for forming filaments, which consists in first alining a guide with the spinning orifice, and then passing a cleaning rod in conducted engagement with said guide through the alined orifice.

2. The combination with a filament forming device having a wall with a recess, and an orifice plate contained in said recess, of a guide complemental to said recess entering therein, said guide having an internal guideway in line with the orifice in said plate, and a rod movable through said guideway and said orifice.

3. In combination with a spinneret having a hole and an orifice plate located in said hole below the entrance thereto, of a guide complemental in form and dimensions to said entrance, adapted to enter therein and establish a predetermined relationship therewith, said guide having a guideway which is then alined with the spinneret orifice, and a cleaning implement slidingly fitted in said guideway and adapted to extend therefrom through said orifice.

4. A tool for cleaning spinnerets comprising a hairlike cleaning rod, a sheath for said rod, a plunger having a tapered socket receiving one end of said sheath, and in which said end is received and compressed upon the cleaning rod, and a guide for the end of said rod which protrudes from the sheath.

5. In a tool of the character described, a cleaning implement comprising a rod having a diameter approximating the diameter of a hair, a holder for said cleaning implement, and a sheath surrounding said implement and extending into said holder, that part of the sheath which extends into the holder being compressed upon the cleaning implement.

6. A tool for cleaning spinnerets comprising a guide member having an external centering portion and an internal passageway, and a cleaning implement fitting slidably in said passageway and adapted to be protruded through the said centering portion.

7. A spinneret cleaning tool comprising a base, having a work support, a plunger having a centering projection mounted with provision for moving toward and away from said support, said plunger having an interior passageway, and a cleaning rod movable in said passageway and arranged to be protruded from said centering portion.

8. A spinneret cleaning tool comprising a base, having a work support, a plunger having a centering projection mounted with provision for moving toward and away from said support, said plunger having an interior passageway, a tool holder contained within said plunger and rising above the same, and a spring interposed between a part of said tool holder and said plunger arranged and adapted to transmit movement from the former to the latter.

9. In a tool of the character set forth a base structure, a tubular plunger movable in said base structure, an inner plunger movable in said tubular plunger, a combined centering member and implement guide mounted on one end of said tubular plunger and having an interior guideway, a sheath contained in said guideway and secured to the inner plunger, and a cleaning implement contained in said sheath and protruding therefrom, the outer end part of said guideway being of dimensions to fit the protruding portion of said implement.

In testimony whereof I have affixed my signature.

OLOF OHLSON.