

Dec. 16, 1969

P. DARPIN

3,483,740

DEVICE FOR INDICATING THE RELATIVE ELONGATION
OF FIBERS PRIOR TO BREAKING

Filed Oct. 28, 1966

3 Sheets-Sheet 1

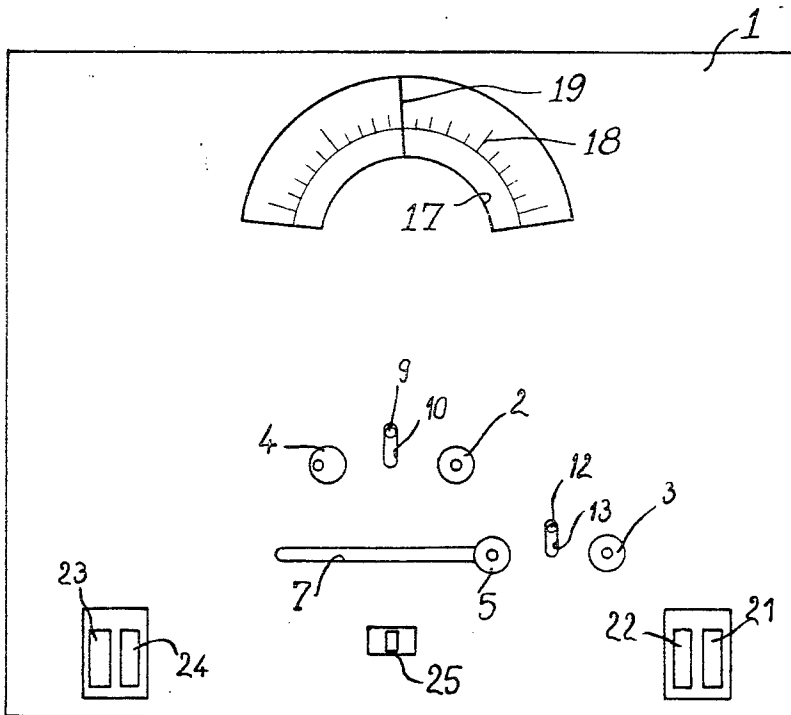


Fig. 1

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3 Sheets-Sheet 2

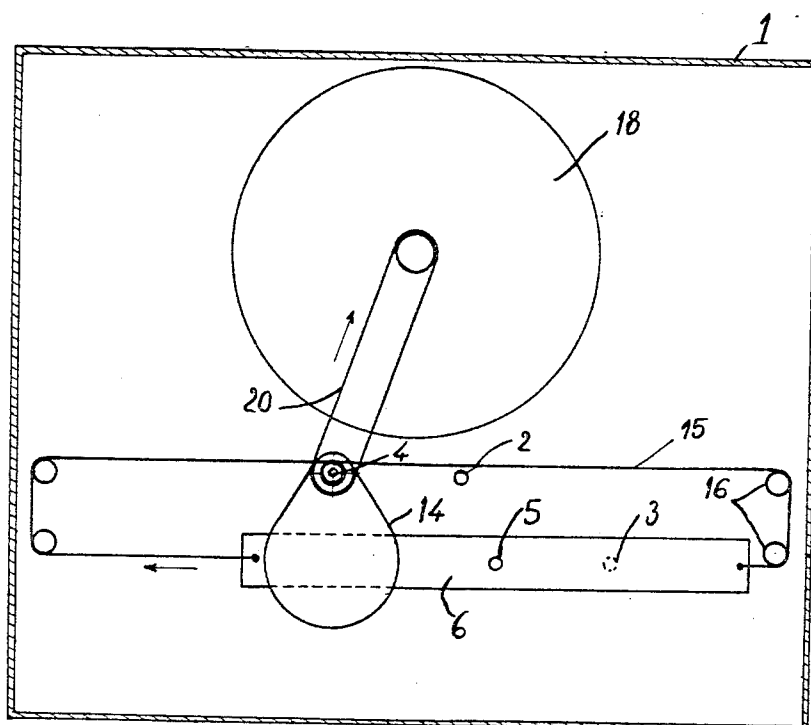


Fig. 2

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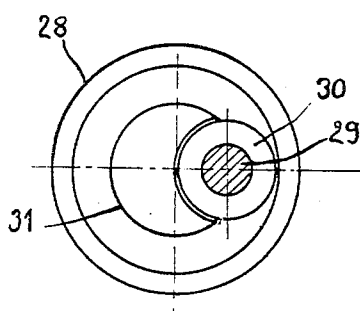
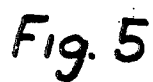
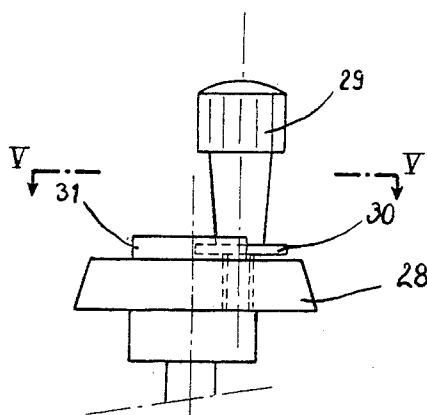
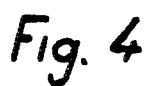
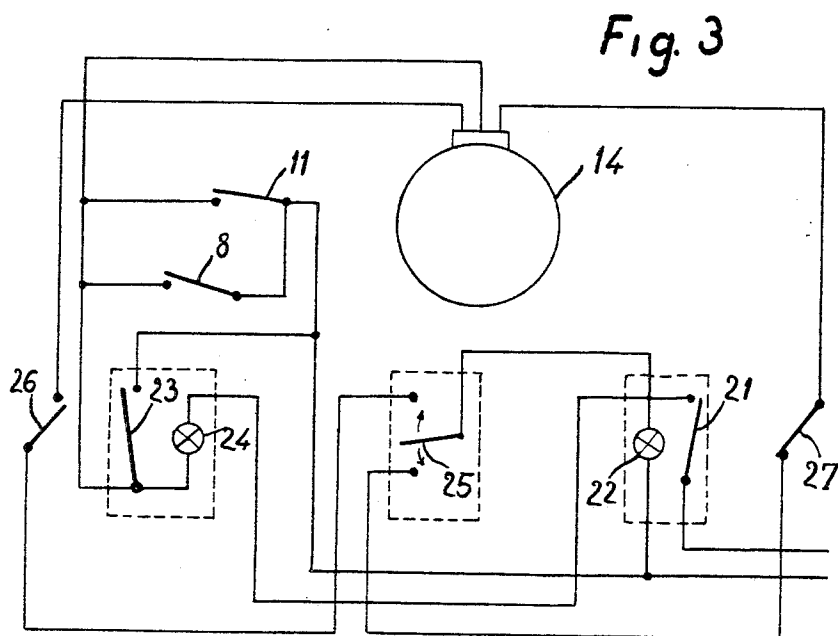
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DEVICE FOR INDICATING THE RELATIVE ELONGATION OF FIBERS PRIOR TO BREAKING

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6 Claims

ABSTRACT OF THE DISCLOSURE

A fiber or hair to be measured for relative stretch or elongation prior to breaking is fastened at one end to a fixed stud while the other end is gripped by a movable stud. The movable stud may either rotate or slide in a direction away from the fixed stud in order to apply tension to a fiber under test. An electric motor, which drives the movable stud, is controlled by a microswitch actuated by a dog positioned between the fixed and movable stud in a position to be engaged and actuated by the fiber under test. An indicator dial, also driven by the electric motor, registers the movement of the movable stud.

This invention relates to a device for measuring the characteristics of fibres, particularly for measuring the stretch or elongation to the breaking point of a hair or any fibre under certain conditions of tensile stress.

It is known that the use of dyes, decolourisers and products intended for permanent waving requires that the quality of the hair treated should be known in order that it may not be damaged and in order that the treatment may be fully effective.

Among the qualities of the hair, determination of its dry or wet stretch under longitudinal tensile stress or during winding is particularly useful for effectively employing the various capillary treatment products.

The differences in stretch between a dry hair and a hair which has previously been immersed in a slightly alkaline aqueous solution make it possible to determine the degree of porosity of the hair, so that a different type of product may be employed, depending upon the result of the tests.

The invention accordingly relates to a device for measuring the stretch in order to enable one to determine, the porosity of a hair, which is more particularly distinguished in that it comprises fixed clamping members, to one of which one end of the hair is attached, and movable clamping members, to one of which the other end is attached or fixed, the movement of these movable clamping members being measured by an indicator connected to a drive member which drives the movable clamping members.

An illustrative embodiment of the invention will now be described with reference to the accompanying drawings, in which:

FIGURE 1 is a plan view of a measuring device according to the invention.

FIGURE 2 is a diagrammatic view showing the operation of the various elements of the device according to the invention which is illustrated in FIGURE 1.

FIGURE 3 is an electric circuit diagram of the device according to the invention as illustrated in FIGURE 1.

FIGURE 4 is an elevational view of the rotatable stud of the device illustrated in FIGURE 1, and

FIGURE 5 is a sectional view taken along the line V—V of FIGURE 4.

The measuring device according to the invention as illus-

trated in FIGURE 1 comprises an upper plate 1 supporting the various measuring elements.

Mounted on the said plate 1 are two fixed studs 2 and 3 for the attachment of the hair, which are associated with two movable studs 4 and 5 respectively.

The stud 4 is rotatably mounted, while the stud 5, which is fixedly mounted on a plate 6 which is movable below the upper plate through a slot 7 in the upper plate.

The hair stretched between the studs 2 and 4 actuates a microswitch 8 fixed below the upper plate, the control dog 9 of which extends through the plate by way of an aperture 10.

Likewise, the hair stretched between the studs 3 and 5 actuates a microswitch 11 comprising a control dog 12 movable in an aperture 13 in the upper plate.

The rotatable stud 4 is driven by an electric motor 14 which also drives the plate 6 by way of a belt 15 secured at each end of the said plate and extending around guide pulleys 16.

The upper plate is also formed with an aperture 17 through which there appears a graduated circular dial 18 which moves past a fixed index 19. The said dial 18 is rotated by the motor 14 by way of a transmission belt 20.

Also fixedly mounted on the upper plate 1 are on the one hand a general switch 21 provided with an observation aperture 22, and on the other hand a starting and resetting switch 23 and an inspection aperture 24, while there is situated at the centre an operation-reversing switch 25.

The electric circuit comprises in addition two normally closed limit switches 26 and 27 actuated by the plate 6, which are provided in the supply wiring of the motor between the reversing switch 25 and the supply terminals of the motor 14.

The attachment studs comprise a base 28, FIGS. 4 and 5, into which is screwed a knurled button 29, the hair being gripped between the base 28 and a washer 30 disposed between the button and the base.

On the other other hand, the rotatable stud comprises this hair-attaching device, but the base 28 is formed with a circular shoulder 31 centered on the axis of rotation, the said shoulder being recessed to receive the washer 30 and the knurled button 29, so as to enable the hair secured under the washer to be wound against the shoulder 31.

The device operates as follows:

The hair is secured on the stud 2 or 3, whereafter it is passed behind the dog 9 or 12 and secured to the movable stud 4 or 5 while being stretched in order to operate the microswitch. It is then sufficient, after voltage has been applied to the device through the switch 21, to press the reversing switch 25 in the desired direction in order to start the motor 14, whereby the hair is stretched either by winding if it is secured on the stud 4 or by a longitudinal pull if it is secured on the stud 5. When the hair breaks, the dog of the microswitch which is no longer maintained by the hair returns to its initial position and interrupts the supply to the motor, and that mark on the dial which has stopped at the fixed index then indicates the maximum elongation of the hair.

If the operation is stopped before the breaking point and the direction of the motor is reversed, the hair gradually releases the dog of the microswitch, which interrupts the supply as soon as the hair ceases to be stretched, and in this case that mark of the dial which is opposite the fixed index indicates the permanent elongation of the hair for a given elongation from the unstressed condition.

These same operations may be recommenced with a wet hair, and the results, when compared with those of the dry hair then enable the porosity of the hair to be assessed.

This apparatus therefore permits comparative measurements with reference to a so-called normal hair for which the graduated dial has been calibrated.

The invention is not limited to the single embodiment described and illustrated, but covers all variants thereof, and in particular the motor 14 could rotate a needle in relation to a fixed dial.

I claim:

1. A device for indicating the relative elongation of fibers prior to breaking, comprising: fixed clamping means for fixedly holding an end of the fiber; movable clamping means for gripping the other end of said fiber, said movable clamping means being a rotatable stud having a knurled button for gripping the said fiber, the said knurled button being screwed into the said rotatable stud, the said rotatable stud having a circular shoulder, the said circular shoulder being centered on the axis of rotation of said rotatable stud, the said fiber being capable of being wound around the said circular shoulder; indicator means for indicating the position of said movable clamping means; electric motor means; electrical circuit means connected to said electric motor means and connectable to a source of electric current for actuating said electric motor means; drive means operably connecting said electric motor means with said movable clamping means for moving it in a direction to apply tension to a fiber secured thereto and to said fixed clamping means; drive means operably connecting said electric motor means with said indicator means; and control means in the electrical circuit means and disposed and secured between said fixed clamping means and said movable clamping means in a position to be engaged and actuated by a fiber under test for completing an electrical circuit to said electric motor drive means whereby said movable clamping means will be moved in a direction for applying tension to said fiber and upon the breaking of said fiber, said control means is released to thereby stop said motor.

2. A device for indicating the relative elongation of fibers prior to breaking, comprising: fixed clamping means for fixedly holding an end of the fiber; movable clamping means for gripping the other end of said fiber; indicator means for indicating the relative position of said movable clamping means; electric motor means; electrical circuit means connected to said electric motor means and connectable to a source of electric current for actuating said electric motor means; first drive means operably connecting said electric motor means with said movable clamping means for moving it in a direction to apply tension to a fiber secured thereto and to said fixed clamping means;

second drive means operably connecting said electric motor means with said indicator means; control means in the electrical circuit means and disposed and secured between said fixed clamping means and said movable clamping means in a position to be engaged and actuated by a fiber under test for completing an electrical circuit to said electric motor drive means, and manually operated switch means connected in said electrical circuit means for stopping said electric motor means while said control means is engaged and actuated by the fiber under test and for reversing the direction of said electric motor means and that of said first and second drive means thereby relieving the tension on said fiber, the complete release of tension on said fiber or the breaking of the fiber as a result of elongating it under tension, resulting in the release of said control means and the interruption of said electric circuit to said electric motor.

3. A device according to claim 2 in which said indicator means includes a dial driven by the second drive means and a fixed index, the dial moving passed the fixed index for registering the degree of movement of the movable clamping means.

4. A device according to claim 2 in which said movable clamping means is a rotatable stud.

5. A device according to claim 2 in which said movable clamping means is a sliding plate.

6. A device according to claim 2 wherein said control means for completing the electric circuit includes a control dog and a supply microswitch for said motor, said control dog being capable of controlling said supply microswitch when said fiber bears against it so as to interrupt the supply of electric current to said motor when said fiber is disengaged from the control dog due to detensioning or breaking.

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