Jan. 28, 1969 F. J. STREETMAN 3,423,774

PILLOW COVER

Filed July 24, 1967

Sheet 1 of 2

FIG. 1

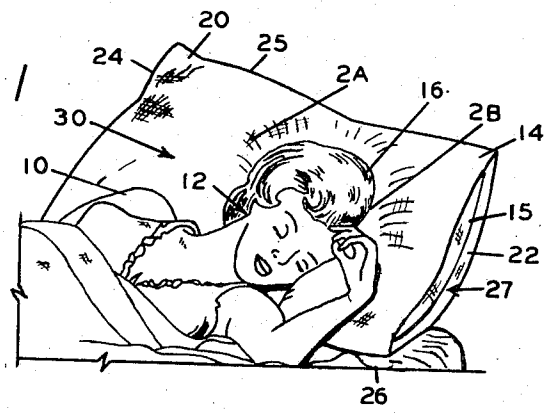


FIG. 2

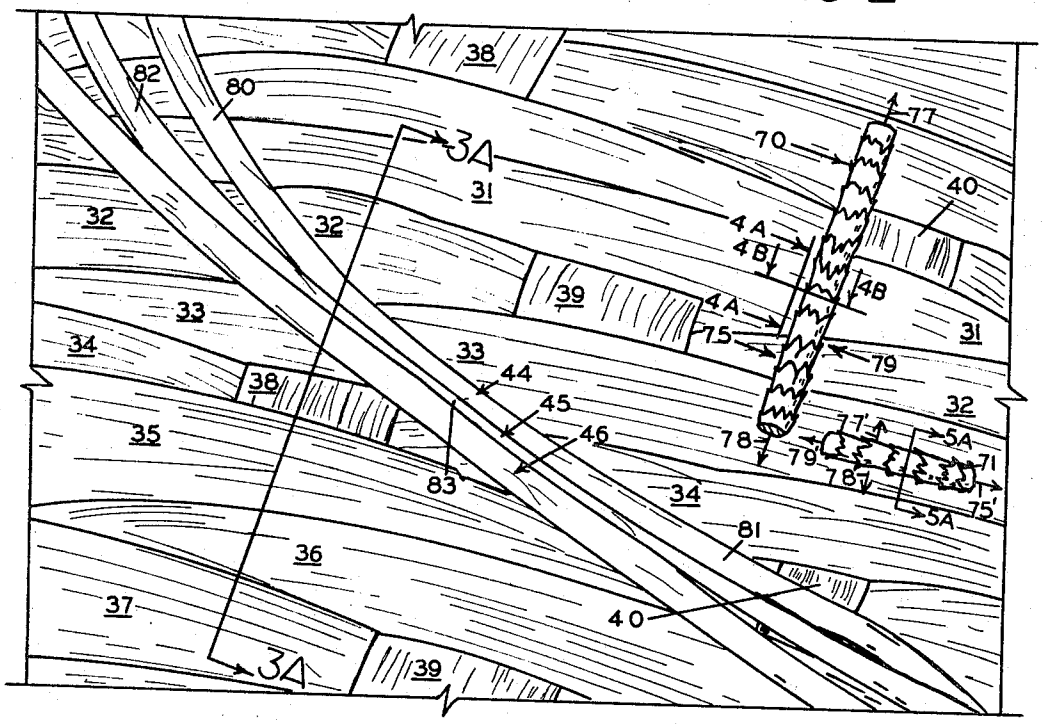
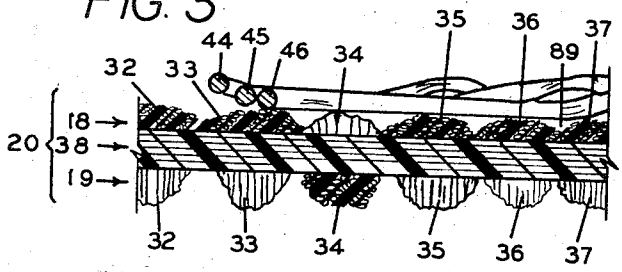


FIG. 3



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FIG. 4

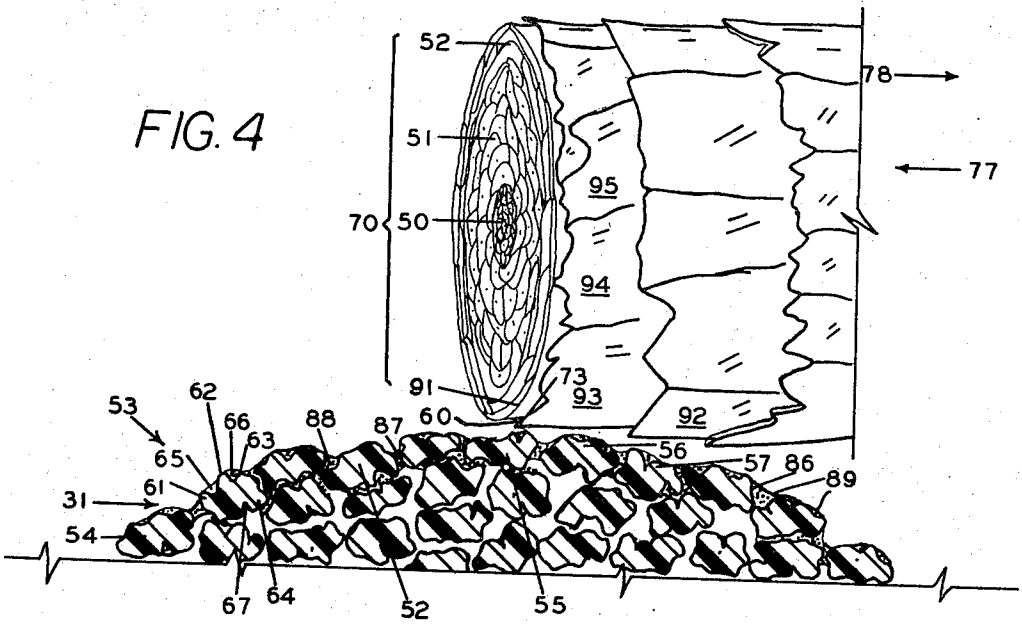


FIG. 5

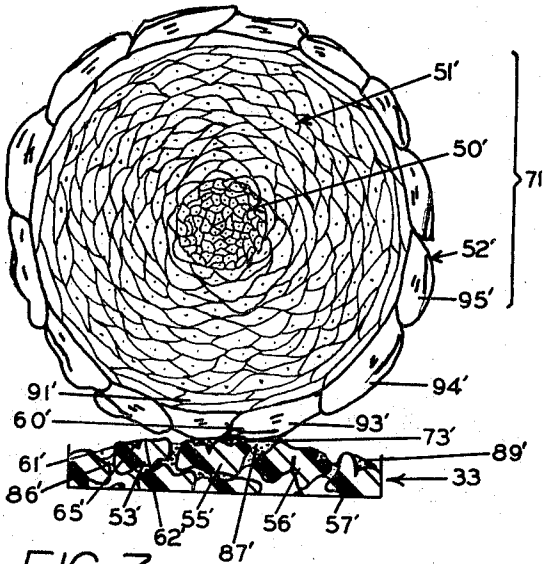


FIG. 6

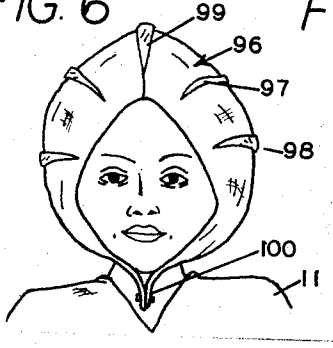
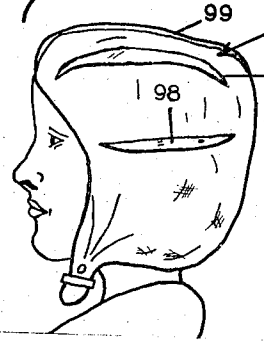


FIG. 7



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United States Patent Office 3,423,774
Patented Jan. 28, 1969

3,423,774

PILLOW COVER

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Filed July 24, 1967, Ser. No. 655,601
U.S. Cl. 5—339
Int. Cl. A47g 9/02
3 Claims

ABSTRACT OF THE DISCLOSURE

This invention provides a combination of size and arrangement of fibres of particular chemical and physical characteristics in combination with and forming a reservoir for an oleophobic and hydrophobic coating material adequately held on said combination of fibres for use as a nondisturbing support element for human hair arranged in a decorative coiffure.

BACKGROUND OF THE INVENTION

Fields of the invention

A special cover for a device to be placed under the head of a person in a supine position, the person being a lady with a coiffure of styled hair; and a head covering provided with structure and composition having also as its function to protect a coiffure of styled hair.

Description of the prior art

While preparation of styled hair is a well developed art (e.g., "Standard Text Book of Cosmetology," Milady Publishing Corp. 1959, reprinted 1964) the problem of maintaining the coiffure during sleep of a lady with such styled hair has remained a problem. This is notwithstanding the ready availability of knowledge of available materials (e.g., "Man Made Fibres" by R. W. Moncrieff, John Wiley & Sons, New York, 1963; "Applied Textiles" by George E. Linton, Duell Sloan & Pearce, New York, 1961; "Source Book of New Plastics," vol. 2, H. R. Simonds, Reinhold Publishing Corp., 1961 and "Practice and Science of Modern Barbering" by Milady Publishing Co., New York, 1959).

The problem of the prior art has been that during motion of styled hair on a conventional pillowcase during sleep the hair develops twists and tangles that detract from the intended beautifying effect of such coiffures.

SUMMARY

This invention uses the physical and dimensional characteristics of certain multifilament satin weaves and the microscopic structure characteristics of certain cellulose acetate filaments in such weaves relative to and in cooperation with a silicone liquid to create a supporting surface exposed to and contacting human hair in a styled or coiffured form, which supporting surface, because of its chemical and dimensional relationships to human hair, provides, for practical purpose, substantially no friction therebetween. This surface, in form of a pillowcase or pillow cover avoids development of tangles on the head of a person with coiffured or styled hair resting and/or sleeping on a pillowcase or pillow cover with such a surface. The advantage of this invention is not only in that it avoids development of tangles in the hair but provides the user with restful sleep due to comfortable support of the head during sleep.

Insofar as this may be regarded as a chemical invention the utility of the invention is the provision of a surface on which human hair may rest with a minimum of friction. Thereby not only is the high denier filling effect satin acetate silicone surface useful as a pillowcase or pillow cover but also as a cover and protector for an erect person with a coiffure of styled hair requiring protection from disturbance by the wind.

The gist or inventive concept, as below described in detail, is that the famed softness and smoothness of women's hair is found to be contradicted by the microscopic structure thereof. This invention develops and utilizes the above described supporting surface to avoid the difficulties created by such microscopically observable structure and thus avoids the problem of the prior art.

One object of this invention is to form a pillowcase or pillow cover for resting a lady's head provided with a coiffure, which pillowcase or pillow cover maintains table and desirable surface characteristics, notwithstanding laundering of such pillowcase or pillow cover.

Another object of this invention is to provide a hair covering for use by a woman whose hair is arranged in a decorative coiffure.

Other objects of this invention will become apparent to those skilled in the art of the study of the below specifications and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings are referred to in this description and form a part of the description for purpose of illustrating the meaning of the words set out in the description, and like numbers therein refer to like parts throughout.

FIGURE 1 is an overall view of a user of the pillowcase of this invention;

FIGURE 2 is a perspective view at approximately one hundred power magnification of the zone 2A of FIGURE 1 with some strands of hair located thereon for purpose of illustration as occurs at zone 2B;

FIGURE 3 is a transverse cross-sectional view at section 3A—3A of FIGURE 2;

FIGURE 4 is a further enlarged sectional view along section zone 4A—4A and 4B—4B of FIGURE 2 showing the longitudinal relationship of the scales on the hair to the size of filaments of the cloth, this view being shown at approximately 700× magnification;

FIGURE 5 is a sectional view enlarged to the same scale as in FIGURE 4 but taken along section 5A—5A of FIGURE 2 to show the relations of the filling yarn filaments to a transverse section of one strand of hair;

FIGURE 6 is a front view of another coiffure protector;

FIGURE 7 is a side view of the embodiment of coiffure protector shown in FIGURE 6.

The pillowcase **14** formed and treated as below described is of particular value for use with hair that has been damaged or otherwise become excessively porous.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The pillowcase **14** is 20" x 28" in size; about ½ cubic centimeter of silicone fluid is used to treat the upper surface **18** thereof.

In FIGURE 1 a woman **10**, is shown with her head **12** resting on a pillowcase **14**. Her hair **16** is in contact with the pillowcase **14** at zone 2B. The pillowcase is supported on a pillow cushion **15** therein.

The pillowcase **14** has a rectangular top cover portion **20** and a rectangular bottom cover portion **22**. The top and the bottom cover portions are joined to each other at the left edge **24**, front edge **25** and rear edge **26**. The right end **27** of the pillowcase is open for insertion and removal of the case **14** from the cushion **15** as required for laundering as is conventional. The conventional plain seam is used at edges **24** and **25** on the interior of the pillowcase to keep the portions joined to each other. In the particular embodiment herein shown the cloth, **30**, is a No. 500 panné satin with a 75 denier bright acetate warp and a 150 denier bright acetate filling. The cloth count is 200×58. The weave is a five (5) shaft filling effect weave with a base of 3. The cloth, **30**, which is formed of filling yarns such as **32–37** and warp yarns as **38–40**, is shown in

FIGURES 2 and 3. No surface design is visible on the satin fabric cloth **30** because the yarns that are thrown to the top or outer surface **18** of portion **20** are greater in number and finer in count than the yarns used to form the underside as **19** of that cloth. This fabric **30** is a filling-faced fabric also known as a sateen weave.

Each filling yarn as **33** is a multifilament yarn and is composed of separate continues filaments each about 1/50 millimeter (±20%) wide and 1/70 millimeter (±20%) thick. Each individual filament as **54, 55, 56, 57** has a maximum diameter of from about 1/3 to about 1/5 that of the usual adult Caucasian human hair diameter such as strands of hair shown as **44, 45, 46**. The yarn is a secondary cellulose acetate rayon with an acetyl-hydroxyl ratio of about 23:7. The pillowcase **14** is, in the preferred embodiment, sprayed with a liquid silicone which adheres to the outer surface **18** of the acetate cloth as below described.

The particular silicone is a Dow-Corning® 200 fluid. This is a clear water-white silicone fluid; it is a dimethyl siloxane polymer. This material is non-rancidifying and odorless as well as not greasy. It is insoluble in water as well as in paraffin oil. This material is soluble in acetone, dioxane as well as methylethyl ketone and methylene chloride as is also the cellulose acetate of which cloth **30** is made. This silicone material is sprayed or rubbed on to the cloth **30** and, as below described, is located in the crevices between the longitudinally elongated lobules of which the filaments are formed as well as between the separate filaments. Accordingly the silicone fluid is firmly though fluidly attached to cloth **30** and remains there.

The adult Caucasian human hair is about 1/20 to 1/10 millimeter in diameter. This is substantially thicker than the 1/50 millimeter diameter individual filaments as **54–57** of which each of the filling yarns of the cloth **30** are formed (25 filaments per yarn) so as to permit the hair to move freely over the face of the cloth in some directions as below described.

The particular silicone liquid used is one having about 3.5 centistokes. This material has a boiling point range of 158° F. to 212° F. at 0.5 millimeter pressure. It has a flash point of about 250° F., a pour point of −148° F., the specific gravity is 0.900; it has a refractive index of about 1.394 and a surface tension at 77° F. of 19.2 dynes per centimeter.

This silicone liquid "balls up" on human hair (as does water on oil), even after that hair has been treated with a "permanent"; i.e., the silicone does not adhere thereto and is repellent thereto. Nevertheless the silicone does adhere to the surface of the acetate filaments. This provides a smooth peripheral hair-repellent surface on the acetate and provides for frictionless motion of the surfaces of the hair over the surfaces of the cloth **30** in any direction, not just some.

Because of the formation of the yarn by a multiplicity of small filaments and wetted by the silicone, as seen along section 3A—3A and in FIGURES 4 and 5 the outline or profile of each yarn relative to the hair is that of a generally ovoid rather than semicircular surface presented to the bottom of each hair where each hair contacts it. Accordingly each strand of hair and **44, 45, 46** in the overall, as shown in FIGURE 3, contacts a series of overlapping smoothly curved surfaces such as the top of yarns **33, 34, 35** and **36**. Because separate filaments of the high denier (100–300) filling yarns spread out on surface **18**, each of such curved surfaces on the outer surface **18**, is about three times as wide as high.

By the use of this pillowcase it is found that when women having their hair styled in coiffures sleep thereon that no hair tangles result. It appears that this is due to the absence of catching of the hair on any direction of movement over the surface of the pillowcase. The pillowcase may be washed and still preserve this capacity. If a multifilament yarn is not used as below described or a satin finish as below described and the relationship of size of filament to hair as below described is not used and also if the morphology of the fibres and a silicone is not used as herein described the hair does catch on the usual pillowcase or pillow cover. The explanation herein given of the particular compositions and action is for purposes of description of the action of the material and structures used so that the scope of equivalents as herein disclosed may not be limited by the particular examples.

A shaft of hair as **70** of FIGURE 4 is composed of a medulla **50**, a cortex or middle layer as **51**, and a cuticle **52**. Cuticle **52** is composed of scale-like cells as **91–95** which project over the surface of the hair in an overlapping fashion and are all directed in the same direction on any one hair shaft. Hair shaft **71** is composed of a like medulla **50'**, cortex **51'** and a cuticle **52'**. Cuticle **52'** has scale-like cells as **91'–95'** (the ' added to a referent number (as **50**) indicates a structure (as **50'**) corresponding to the referent).

This scale-like surface of human hair, described in some literature as "soft and smooth," actually is, as seen under a microscope, rough, and catches on fine fibres as available from cottons. The angle which the scales of the cuticle make with the length of the hair shaft determines the "porosity" of the hair. Hair that is frequently dyed or bleached or styled becomes thicker and more "porous" and catches more readily. This is the reason, when a lady with styled hair sleeps on a usual cotton pillowcase, together with movement of the hair relative to the pillowcase, and catching of hair on the pillowcase, some strands of hair are bent, and/or twisted and tangles and coiffure disarray results.

The drawing of FIGURE 4, while a line drawing, is approximately to scale in regard to the showing of (a) the distance between scale ends as **93–92** relative to (b) the diameter (e.g., 0.08 mm.) of the shaft of hair as **70** and to (c) the diameter of the filaments (e.g., 0.02 mm.) such as **54, 55, 56, 57** relative to the hair shaft diameter. As shown in FIGURE 4 the individual filaments as **54, 55, 56, 57** of any one yarn as **31** are relatively flat, i.e., each with its greater diameter horizontal and its lesser diameter vertical or perpendicular to the direction of the horizontally elongated hair ("horizontal" and "vertical" as shown in the drawing). The cross-section sizes of the filaments as **54–57** used in pillowcase **14** are sufficiently large and the cross-sections thereof so shaped as to hold a liquid that is repellent to the hair on such filaments and between adjacent filaments so that the scales of the hair cuticle, even in the highly porous hair of people who regularly and frequently get permanent waves and/or dye, and/or bleach their hair, will not catch on the surface of the cloth **30**. This is not only because the curvature of the periphery of the filaments as **54–57**, as measured by the radius of curvature of each such filament, is usually greater than the distance to a cuticle scale edge (as **73**) from the outer surface of the adjacent portion of the cuticle (as outer surface of scale **91**) measured radially as shown by the distance of **60** of FIGURES 4 and 5 but also because the smooth hair repellent coating of silicone **59**, which does not spread on the cuticle of surface, provides a minimum of friction between the scales that form the surface of the hair and the multifilament yarn forming cloth **30**.

Normally, when acetate is manufactured it has, initially, a slight hydrocarbon oily layer thereon. This layer has a slippery feel to the hand until the normal use of the material results in a creation of creases to which secondary acetate is very non-resistant. Upon laundering the acetate, the oil is removed. Thereafter the pillowcase is dry and the movement of shafts of hair as **70** and **71** thereover results in catching of such hair shafts even on satin weaves, unless silicone is used as herein taught.

A satin weave is used because satin weave does not have a diagonal therein as does, for instance, twill weave. A continuous diagonal interferes with the lustre and smoothness that are one of the desired qualities of the

satin weave herein. Satin weaves usually employ a minimum of five harnesses and in this application, a satin weave is one which does employ a minimum of five harnesses because a smaller number could result in forming a twill weave and a diagonal.

The silicone is retained on the particular filaments used, namely the secondary acetate, because, as shown in FIGURE 4, each single filament as **53** is formed of a series of lobes as **61, 62, 63,** and **64** with radially extending fissures as **65, 66,** and **67** therebetween open to the outer surface of the filament. The silicone does spread on the surface of the filament and also gathers and forms reservoirs as shown in the fissures; such reservoirs provide for a subsequent spreading of the liquid silicone over the surface of the filament. The silicone also forms accumulations as **87** and **87'** between filaments in the filling yarn due to the wetting action of the silicone on its filaments. This layer of silicone forms a smooth and adherent and permanent glass-like coat **89** over the yarn outer surface. The fissures as **65, 66** and **67** on each yarn filament as **53** remain hydrophobic even after washing a pillowcase **14**. Silicone as added to such a pillowcase after washing forms an anchor with the silicone remaining in the fissure and, thereby, forms a smooth peripheral coating such as **89** on the exterior of each filament of secondary acetate such as **53–57** (and **89'** on **53'** to **57'**). Thereby a smooth peripheral surface is formed on each of the lobular filaments because of the presence of the fissure provided on each such filament. The scales as **91–95** (and **91'–95'**) slide on the surface formed by the silicone rather than on the surface of the filament directly.

For purpose of illustration, one portion of a shaft of hair, **70**, is shown in FIGURE 4 with its length perpendicular to the length of the filling yarns, as **31, 32, 33,** on the cloth **30**. The cuticle scales as **91–95** of such portion **70** do not interfere with the movement of such a length of hair (**70**) in one direction, **78**, parallel to the length of the portion **70** over and in contact with the cloth **30** because the scales provide a ratchet action that allows such, but, except for the structure and composition herein taught, motion in direction **77**, opposite to **78**, would produce bending of such strand. However, such does not occur on use of pillowcase **14** not only because the diameter of the filaments as **54–57** and the radius of curvature of the lobular portion of the filament surface are both substantially greater than the distance **60** between the lateral end or tip **73** of a cuticle scale as **93** and the exterior layer of cuticle as **91** located inwardly or centrally thereof but also because the crevices or fissures in the surface of and between the filaments are covered by the thin adherent coating or layer **89** of silicone liquid; this layer, **89**, has a smooth outer surface and repels the surface of the cuticle scale in an elastic manner as well as with a minimum of frictional resistance to the passage of such cuticle scale edge to the filament in direction **77**. Therefore, due to the size of the filaments and the coating of the surface thereof with silicone the cuticle scales do not catch on any portion of the filaments as **54–57** with the motion of hair portion **70** in the direction **77**.

Movement of the portion of hair **70** over cloth **30** in direction **79**, parallel to direction of filaments in yarn **31**, is accomplished by contact of the hair cuticle with the layer of silicone **89** on the peripheral surface of the filaments as **54–57** and does not result in adherence of the hair to the filament of the yarn as the silicone does not wet the hair cuticle: this contact permits a smooth sliding action of hair as **70** over yarn as **31** with no substantial tendency of such movement to twist a hair portion as **70** about its axis parallel to its length.

Additionally for purpose of illustration, another portion of a shaft of hair **71** is shown in FIGURE 5 with its length parallel to the length of the filling yarns, as **33**, of cloth **30**. Such a length of hair **71** moves freely in direction **75'** (parallel to **75**) because the edge of the cuticle scales on shaft **71** point in the opposite direction. Such a length of hair **71** may with pillowcase **14** move freely in the direction **79'** (opposite to **75'**) because the scales slide on the exterior silicone surface **89** of the layer of silicone fluid on the lobular acetate filament.

Additionally a length of hair as **71** may move in direction **77'** (parallel to **77**) or **78'** (parallel to **78**) without the hair becoming wedged or lodged in the interstices as **86, 87** or **88** between adjacent filaments as **53'–57'** because such interstitial spaces are small relative to the diameter of the shaft of the hair, i.e., the interstitial space are, at their widest only .005 to .001 mm., about 5 to 10 percent of the diameter of the hair, and always less than 15 percent of the hair diameter. Thereby any one strand of hair as **71** is not mechanically restrained by the dimensions of the filaments. Additionally, as the surface of the filaments is coated with a layer of silicone, as above discussed and such layer does not adhere to the cuticle scale, the scales are held away from and do not engage with the interstices between the filaments or the fissures within each lobular filament. If the diameter of the filaments **54, 55** and **56** were larged than about ⅓ of the diameter of the hair, the interstitial spaces between such filaments become sufficiently large relative to the diameter of the hair, obstruction to the motion of the hair oriented as **71** relative to the filling yarn in direction **77'** or **78'** would result.

Normally all the hair in contact with a pillow does not lie in one direction as do the illustrative portions **71** or **70**, but, as shown in FIGURE 3 each hair, as **44**, lies with different portions thereof, as **80** and **81**, at an angle to each other as well as at a different angle to some linear feature of the pillowcase cloth. When, by motion of the head **12** of a mass of hair as **16** provided with a pillow support, one piece of hair, as **44**, is moved in direction **79** or **77** and one element, as **80**, of that hair **44** is obstructed while motion of another portion as **81** is not, there would be a twisting and bending of such hair, and loops would form and tangle with an adjacent length of hair, as **45**, which would be similarly but not identically twisted and looped. However, as provided by pillowcase **14**, the friction between hair and support therefor is minimized and such twisting and tangling avoided notwithstanding the movement of such hair relative to the support therefor.

A bonnet **96** to protect a lady's coiffure using the principle above discussed may also be made. It is shown in FIGURES 6 and 7. Details of manufacture of pattern for such bonnet are shown in U.S. Patent 2,522,251 (except for fastening in the front) and Patent No. 1,766,749. The cloth used is a tri-acetate multifilament satin with pleats therein as **97, 98, 99** to provide more styling and body. The interior surface of the bonnet is a filling effect satin identical to that used for surface **18** of pillowcase **14** except that cellulose tri-acetate is used because of its ability to maintain a pleat. After cutting the pattern and sewing the portions thereof together the finished article is sprayed with the silicone liquid as above described (about ½ cu. cm. per 3 square feet) to form a surface layer as **59** above-described on the interior surface of the bonnet. The filament size used in the yarn is the same as in embodiment **14** (namely 0.02±.01 mm. diameter). As cellulose tri-acetate fiber has the same lobular characteristics in transverse cross-section as does the diacetate and silicones adherent thereto the cap **96** provides for protecting the coiffure of a lady from the wind while motion of the cover relative to the hair does not catch on the hair, even if very porous, and disturb the intended structure and effect of the styling of such hair. As with pillowcase **14**, this is of particular value for use with highly porous hair.

A series of snap fasteners **100** are provided at the front of the bonnet to hold it in place beneath the chin of the wearer **11**.

Although in accordance with the provision of the patent

statutes, particular preferred embodiments of this invention have been described and the principles of the invention have been described in the best mode in which it is now contemplated applying such principles, it will be understood that the operations, constructions and compositions shown and described are merely illustrative and that my invention is not limited thereto and, accordingly, alterations and modifications which readily suggest themselves to persons skilled in the art without departing from the true spirit of the disclosure hereinabove are intended to be included in the scope of the annexed claims.

I claim:

1. A pillow cover formed with a top cover portion and a bottom cover portion, said top and bottom cover portions being joined at edges thereof, said top cover portion being formed with a satin weave having on its top surface a filling effect, the filling yarn being a multifilament yarn with the filaments thereof having diameter of 0.2±.01 mm. for use with hair of 3 to 5 times that diameter, the filaments forming said yarn in transverse cross-section being lobular and having longitudinal crevices opening to said top surface and wherein said filaments of the top surface are wetted by a hydrophobic and oleophobic silicone liquid and crevices in the top surface of said filaments are covered by said liquid.

2. Apparatus as in claim 1 wherein said filament is a cellulose diacetate with an acetyl-hydroxyl ratio of 23:7.

3. Apparatus as in claim 2 wherein the silicone liquid is a dimethyl siloxane with a boiling point of between 158° F. to 212° F. at 0.5 mm. pressure, a flash point of about 250° F. and a viscosity at 77° F. of about 3.5 centistokes and a pour point of about —148° F., and a specific gravity of about 0.900, and ½ cubic centimeter of such liquid is applied to a range of between 3 and 4 square feet of area of said top cover.

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U.S. Cl. X.R.

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