(12) UK Patent Application (19) GB (11) 2 438 372 (13) A

(43) Date of A Publication 28.11.2007

(21) Application No: 0610373.3

(22) Date of Filing: 25.05.2006

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(51) INT CL:
A61H 7/00 (2006.01)

(52) UK CL (Edition X):
A5R REQ

(56) Documents Cited:

GB 2411338 A	**GB 1261877 A**
GB 0196904 A	**GB 0003914 A**
FR 002563728 A	**JP 080196463 A**
US 1723024 A	**US 20010020141 A**

(58) Field of Search:
UK CL (Edition X) **A5R**
INT CL **A61H**
Other: **WPI & EPODOC**

(54) Abstract Title: **A procedure for cosmetic treatment of skin by sliding a tool over the skin**

(57) A cosmetic procedure for improving bodily appearance comprises sliding a non-aggressive surface against mammalian skin to develop friction there between sufficient to laterally exercise nearby cutaneous and subcutaneous tissues and induce hypertrophy therein. The sliding may be performed in the presence of a fluid film. The procedure may be used on the human face. The non-aggressive surface may comprise a friction body having a friction face which is rough and stiffer than skin and flexible. The friction face may be an array of flexibly interconnected friction elements which may be made from polymers. The friction body 62 may be a sheet or pad constructed with film, foam or a non-woven web. The friction body 62 may be held on a tool 60 which is hand held. The procedure may comprise use of a tool for sliding the friction face against the skin consisting of a tool body 60 containing a stack of shaped friction bodies 62, the tool having means 61 for releasing the friction bodies 62 one at a time.

Fig 3

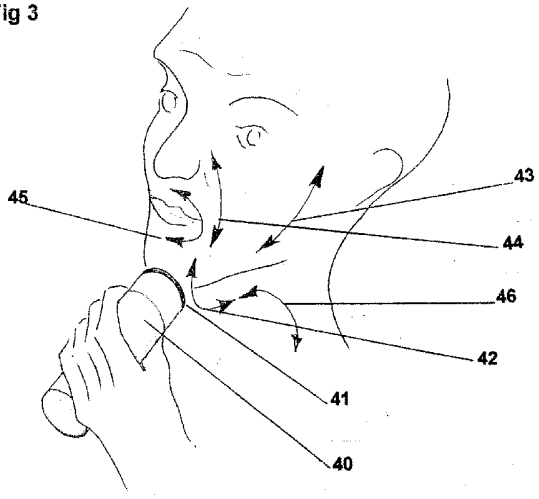

Fig 5

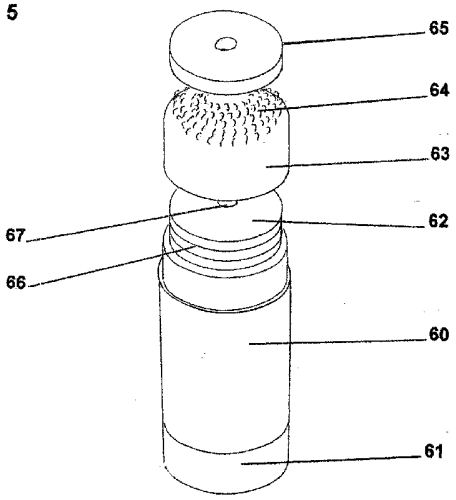

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Fig 1

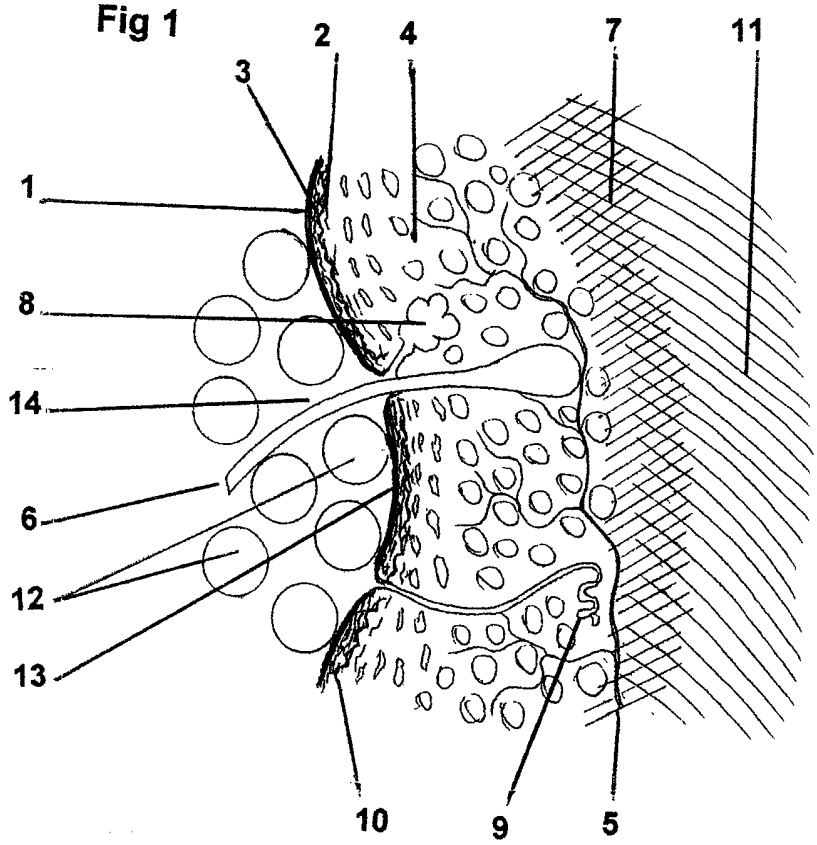


Fig 2

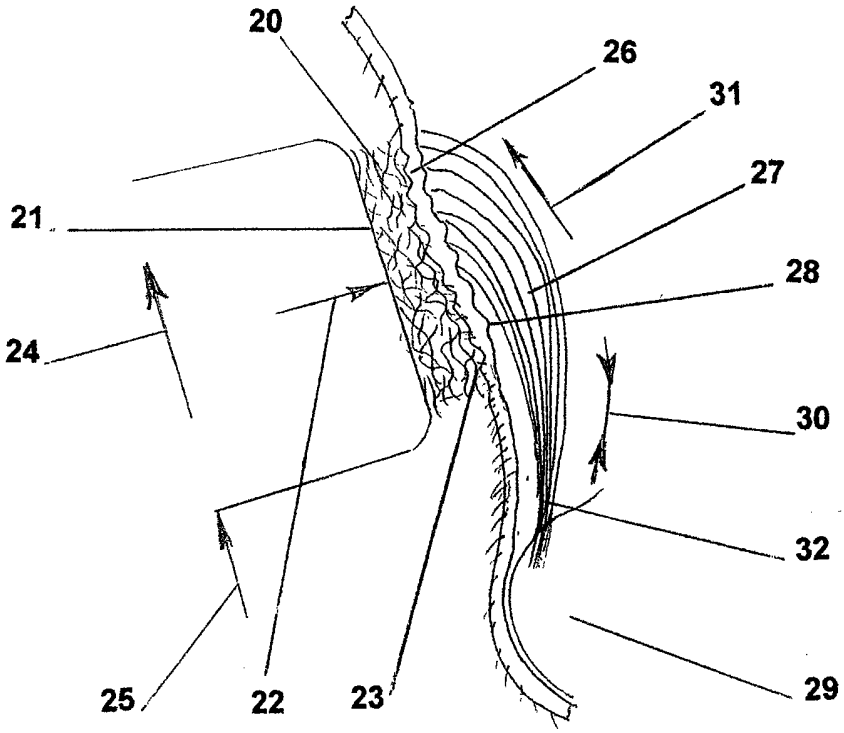


Fig 3

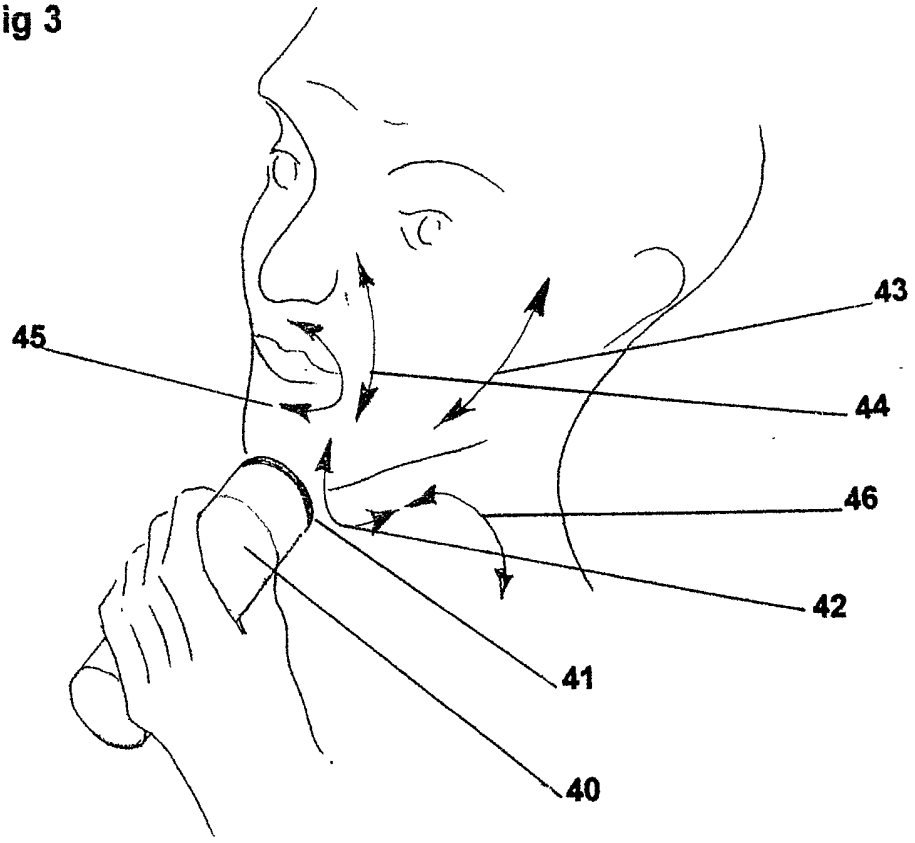


Fig 4

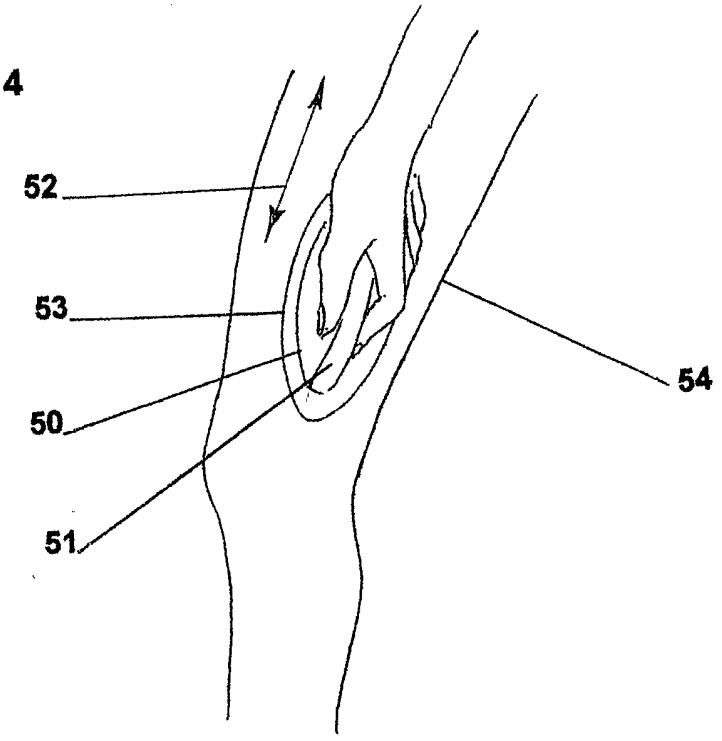


Fig 5

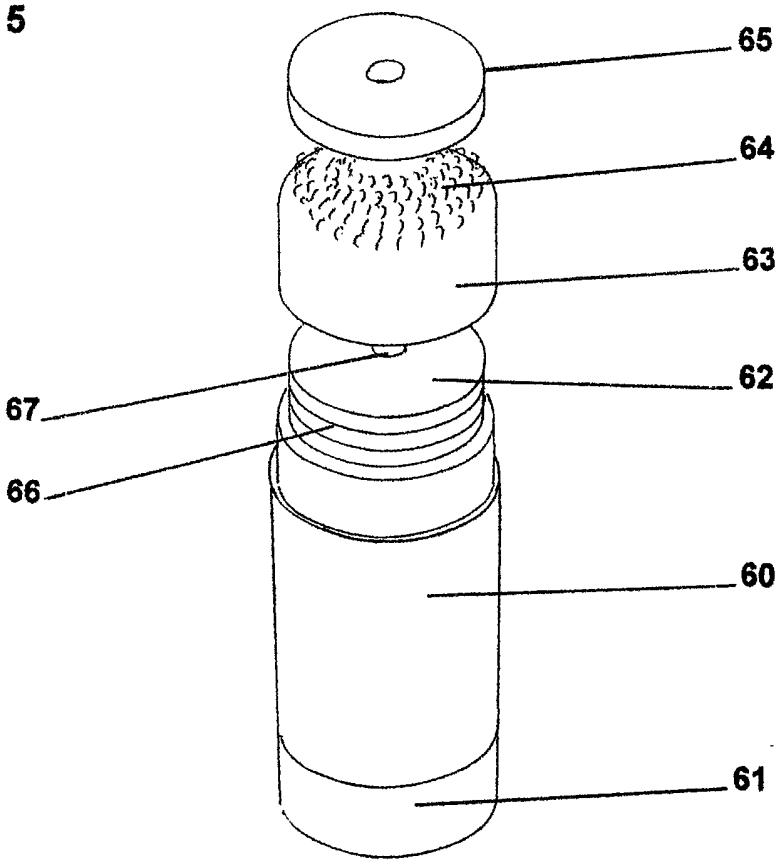
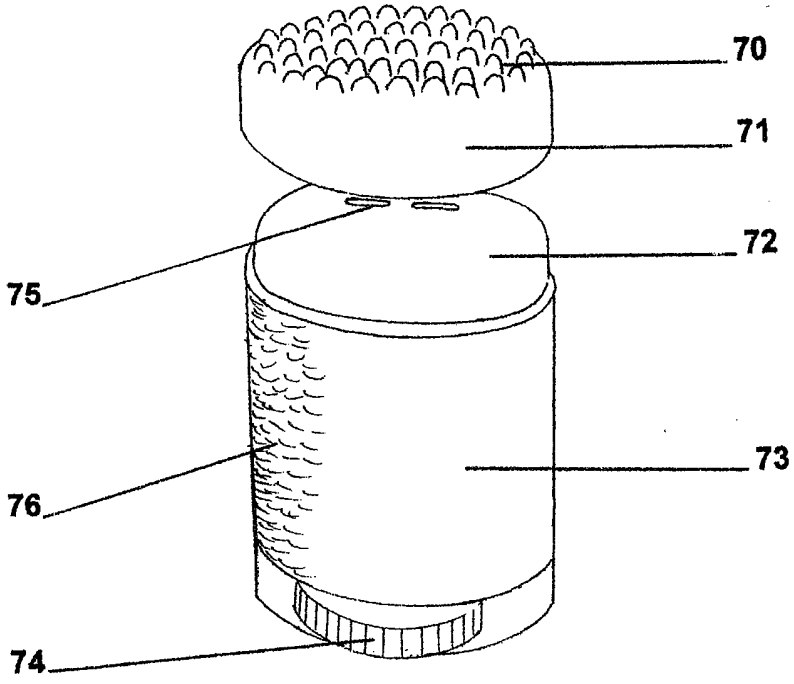


Fig 6



A procedure for improving the appearance of bodily features

This invention relates to a cosmetic procedure that improves bodily appearance, especially around the face, neck and legs. In the procedure a high friction tool is used to exercise the skin and induce cutaneous and sub-cutaneous reactions and hypertrophy in nearby tissues. The procedure includes the topical application of chemical compounds whose absorption and interaction with cutaneous tissue is enhanced by mechanical exercise.

Background

Procedures are known that improve bodily appearance, these may employ topical chemical treatments or physical stimulation.

The chemical treatments are directed at improving the water retention of the dermis to offset the natural deterioration that occurs in ageing. The approach is to use low molecular weight molecules that penetrate the outer dermal layer and interact within the dermis. Typical of such materials are peptides, for example retinol, as disclosed US 6809075.

Several physical procedures are known that exercise subcutaneous muscles to maintain and sometimes recover features that have been lost due to natural degradation. In particular, routines for facial exercise are used in conjunction with devices that improve facial muscle bulk, which reduces wrinkles and sag about the face and neck. Typically these exercise aids are placed in the mouth opening and provide resistance against which facial muscles are exercised. An example of this approach is described in Patent Application US2005/0247318.

Another approach is to stimulate the muscles by externally applying electrical impulses to stimulate muscle contractions. Neurotoxins, which affect subcutaneous muscle are also injected to relax (paralyse) facial muscles and reduce wrinkles.

There are two further rubbing procedures for improving skin appearance These are exfoliation/excoriation and massage

To improve appearance and for personal care purposes it is common to accelerate removal of flaking skin by exfoliating with mild abrasives during cleaning Therefore, it is known to rub the skin with materials capable of

developing aggressive frictional resistance to sliding, but to avoid discomfort exfoliation is often done with fluids that lubricate the interface and moderate damage by abrasion (cutting). Another procedure uses fine dry abrasive particles blasted against the skin to exfoliate the skin. A Loofah is a tool, a rough bundle of natural or synthetic fibres that is also used to frictionally rub and remove dry skin and is usually used wet.

Excoriation is a term used by geologist to describe the removal of a top layer. Cosmetic surgeons use the term to describe a procedure where significant amounts of the epidermal layer may be removed to remove scar tissues and this is usually done with abrasives or scraping with a sharp instrument, which causes sever discomfort and is usually done under anaesthetic.

Massage is said to be the practice of applying structured pressure, tension, motion or vibration. manually or with mechanical aids, to the soft tissues of the body, including muscles, connective tissue, tendons, ligaments, and joints, to achieve a beneficial response. Massage is, done with hands, feet, elbows and a variety of shaped tools. Generally massage is a robust procedure where it is said that the forces applied need to be high enough to hurt if they are to do good! Massage is used mainly for therapeutic purposes to relax and treat muscular injuries. The term 'friction massage' is used to describe some of these treatments. In relation to this invention, this term is misleading because the aim of 'friction massage' is not to treat the skin and its attachments, but rather to treat deep tissues attached to skeletal members. The aim is actually to minimise skin friction in Friction Massage and is often applied through a layer of clothing to prevent friction damage to skin. If done direct, the skin is lubricated to reduce actual skin friction during massage. Thus it is a primary objective in massage to minimise skin friction whereas the objective of this invention is to use a high level of friction against skin to treat the skin.

Excessive friction against skin may cause inflammation and injury; in the extreme it will heat and burn or excessive shear forces will blister the skin by separating layers, but the subject invention operates well below these dangerous levels. Skin can withstand moderate rubbing friction providing it does not damage (traumatise) the stratum corneum, which is the outer layer

of the epidermis. Equally, the stress due to friction should not stretch the skin to an extent where it or its connective tissues are permanently enlarged.

Unlike conventional deep massage, the subject procedure provides significant lateral tensile stress to skin in the regions of the hypodermis, its associated adipose material and muscle tissue coupled to skin. The forces are applied generally in the direction opposing the contraction of the muscle and most beneficially applied while the muscles are contracted, to stretch and thereby exercise those muscles that are connected to the skin.

The problem therefore is how to provide sufficient frictional coupling to an area of skin to stretch and exercise this evenly down to the lower basal regions of the skin and its connective tissues and muscles without damaging the surface of the skin or the elastic tissues in and under the skin.

The problem is solved with a procedure employing a relatively large area friction face that upon sliding against the skin subjects the skin to friction over a usefully large area. The direction of sliding generally follows the alignment of subcutaneous muscles. The friction is non-aggressive, without the risk of cutting or grazing the stratum corneum, but sufficient to grip and laterally stretch the skin evenly, without exceeding the elastic limit of the skin and its appendages. The friction face is made with naturally interlocking or high friction material. The procedure may include the topical application of a fluid compound at the sliding interface formulated to have desirable tribological characteristics and other useful cosmetic functions. The exercising of the skin improves absorption of topically applied substances.

Summary of Invention

According to one aspect of the present invention, there is provided a cosmetic procedure for improving bodily appearance, characterised by

> sliding a non-aggressive surface against mammalian skin to develop friction therebetween sufficient to laterally exercise nearby cutaneous and subcutaneous tissues and induce hypertrophy therein.

In a further aspect of the present invention there is provided a cosmetic procedure wherein

a non-aggressive friction face slides against mammalian skin to exercise nearby cutaneous and sub cutaneous tissues and induce hypertrophy therein, the sliding done in the presence of a chemical compound, the sliding friction face carried on a resilient friction body.

In a still further aspect of the present invention, there is provided the procedural steps of:

pressing a friction face against the skin with average contact pressures ranging between $3.3X10^{-5}$ and $0.012N/mm^2$ over an area greater than $100mm^2$,

while maintaining the contact pressure, applying a second lateral force sufficient to slide the friction face against the skin,

reciprocally sliding the friction face over cutaneous and nearby subcutaneous tissue thereby inducing hypertrophy therein, the sliding done in the presence of a chemical compound, the sliding friction face carried on a resilient friction body.

Description

The invention provides a cosmetic procedure for improving bodily appearance. The term 'Bodily Appearance' means the shape of some parts of a mammalian body as well as its surface texture and colour; in other words all the features that influence the visual appearance of part of a body.

The procedure provides means of frictionally inducing stress in a mammalian body to exercise parts of its constituent tissues. Mammalian means part of a mammal, either human or animal. Tissue is understood to mean an aggregation of morphologically similar cells and associated intercellular matter acting together to perform one or more specific functions in the body. There are four basic types of tissue: muscle, nerve, epidermal, and connective. The epidermal tissue being skin with or without hair appended. The skin also having internal appendages, principally connective tissues that join the skin to the body; it is exercising and expanding these internal tissues and especially muscles that contribute most to improving bodily appearance.

There are three means by which sliding a non-aggressive surface against mammalian skin improves bodily appearance, these are:

First, rubbing the stratum corneum (the outer layer of skin) with a non-aggressive, essentially non abrasive friction face hastens the removal of dead platelets of keratin by shearing off those that are about to be naturally shed, shearing polishes the skin leaving it smooth with better reflective colouring. Called exfoliation, this is normally done with an abrasive compound that is aggressive and actually damages the skin by scraping and cutting at a microscopic level to raise friction. In this invention a sufficiently high level of sliding friction is generated without the need to use abrasives.

Second, friction coupling during sliding deforms (stretches and compresses) the skin and therefore exercises cutaneous material within the skin and stimulates blood flow in its basal regions. The skin actually responds to deformation as a potential injury and increases the blood supply and causes fluid to be retained by slight swelling as a precautionary reaction; the extra blood pinks the skin to improve reflective colour as well as thickening the skin slightly.

Third, stress is transmitted via the cutaneous layer into nearby tissues and exercises muscles, especially those attached to the hypodermis, which is the lower layer of the skin. Muscles respond to exercise by enlarging, the enlargement, referred to as hypertrophy. This enlargement takes up sagging skin and temporarily reduces wrinkles. This is sometimes referred to in cosmetic terminology as firming the muscles.

Sliding or kinetic friction causes frictional coupling and will be affected by the presence of a fluids at the sliding interface. The fluids may be due to natural excretions from the skin or to a topically applied compound. Friction between the friction face and the skin in the presence of a fluid is due to some combination of intermolecular reactions, viscous shear and mechanical deformation due to interlocking.

The topical application of fluid at the sliding interface may reduce friction because it acts as a lubricant; or it may raise friction in which case it acts as an anti-lubricant. The term topical describes a fluid introduced locally to the skin surface. The fluid may be a compound created for a personal care purpose such as cleaning skin and intended originally for simply rubbing onto

the skin by finger. However, its effectiveness is likely to be improved by the procedure described herein because the mechanical agitation provided by the sliding friction improves wetting and absorption.

The viscosity of the introduced fluid compound may vary from a thin free flowing liquid up to a thick gel or it may beneficially be thixotropic, which means it stiffens as it is deformed, thus raising the friction during sliding. The compound may also contain mild abrasive, providing the abrasives are fine and do not damage the skin during exercise. It is desirable at the microscopic level that a thin film of fluid, perhaps only a few molecules thick should separate the friction face from the skin at the sliding interface to protect the skin.

The behaviour of thin films under the stress of sliding is described in Tribology (the science of lubrication) as elasto-hydrodynamic separation, it means that there remains a continuous film of material separating the friction elements on the friction face and the skin during frictional sliding; therefore the skin is actually deformed through the separating film. This thin film provides sufficient shear coupling with the skin to remove dirt and dead skin platelets.

The pressure exerted on the film can become significant at sliding contacts and these high pressures are sufficient to drive fluid into and through microscopic damage sites in the stratum corneum from where low molecular weight elements more easily diffuse into the dermis. Also, the compound is forced down hair and sweat pores that penetrate the dermis. Thus during the procedure, the sliding improves topical wetting and adsorption on the microscopic scale. This improves chemical absorption into the dermis, which improves the function of chemical compounds formulated to chemically interact with cutaneous tissue and possibly subcutaneous tissue.

Thus the procedure may include the topical application of chemically active compounds whose functions are improved by the friction induced cutaneous and subcutaneous exercise.

Some examples of the function of the introduced fluid compounds are, cleaning compounds, exfoliating compounds, depilatory compounds and conditioning compounds such as moisturisers, anti-ageing compounds, shaving gels and soaps, and antiseptic cleaning compounds for the cosmetic treatment of skin disorders such as acne.

Compounds containing soaps or oils tend to reduce friction whereas deionised water and alcohols tend to raise friction, especially with polyurethane friction faces. Of particular interest are materials that change the frictional properties between the friction face and skin during a procedure.

An example of this is lathering with shaving soap where the soap is applied to the friction face by impregnating it into a friction body. When wetted with water caked soap has a very low coefficient of friction, then as the soap dissolves more friction elements are exposed and the coefficient of friction rises influenced by the propensity of the unshaven stubble hair to interlock with the rough friction face on the pad. It is as a result of hair interlocking that the facial muscles are very well exercised leading to an improvement in facial appearance after shaving due to hypertrophy. The high friction due to interlocking also has a beneficial effect on plucking out the ingrown ends. As sliding continues, the hairs become thoroughly worked and wetted and soften leading to a very satisfactory smooth shave.

Fluid compounds used with the friction body in the procedure may be either applied separately or through the porous friction face. The compounds may be either lathering or non-lathering; wherein the lathering compound may be selected from the group consisting of anionic surfactants selected from the group consisting of sarcosinates, sulfates, sulfonates, isethionates, phosphates,taurates, lactylates, soaps and mixtures thereof. Non lathering noniopnic surfactants are selected from the group consisting of amine oxides, allkyl glucosdes, alkyl polyglucosides, polyhydroxy fatty acid amides, alkoxylated fatty acid esters, sucrose esters, and mixtures thereof. Amphoteric surfactants selected from the group consisting of betains, sultains, hydroxysultains, alklyiminoacetates, iminodialkanoates, aminoalkanoates, and mixtures thereof.

While the procedure is potentially useful over most areas of a mammalian body, it appears to be particularly beneficially when used around the human face and neck where there are many muscles that are visible through the skin and these are coupled to the skin and control expressive reactions, such as smiling or frowning. The size and condition of the facial and neck muscles declines with age and cause cosmetic problems especially around the lower face. A visible improvement occurred with these muscles after only two or three applications of the procedure and that the improvement

lasted several days. Thus, the exercising of muscles by the procedure for cosmetic purposes stimulates and restores muscle bulk; the improvement is maintained by regular use of the procedure.

For areas such as the chest, back and limbs like legs, arms and hands there is less bulky muscle attached to skin, therefore the benefits of friction-induced exercise are less evident in improving muscles. The procedure is useful for exercising irregular shaped deposits of adipose fatty tissue attached to the hypodermis, which occurs at the back of female legs and is often referred to as cellulite. The deposits are reduced somewhat by disruption and wearing down due to internal friction during exercise with the procedure, particularly when a thermoformed polyurethane or silicone rubber friction face is used. Tests revealed that it might take several weeks of daily procedures before benefits become evident on cellulite and areas of loose wrinkled skin as often seen on the back of aged hands and the top of feet. However, the procedure immediately stimulates blood flow to the skin wherever it is applied and this does appear to improve the health and appearance and slightly thickens skin over time.

The outer layer of mammalian skin is known as the epidermis, the outer surface is called the stratum corneum. The epidermis is a layer of 12 to 15 flat platelets of dead and dying keratin material, this layer typically between 0.07 and 0.12mm thick. These platelets are joined with flexible lipid material that seals the outer layer. The platelets naturally shed.

Material of the friction face should be non-aggressive to prevent it damaging the epidermis during sliding. Damage may occur if the friction surface is abrasive or carries materials that are capable of cutting or if there are sharp scraping edges that might start to penetrate into the stratum corneum somehow. If the friction face is harder than the stratum corneum it has the potential to abrade, but providing it does not have sharp edges it is unlikely too, providing the contact forces remain moderate, these hard friction surfaces are therefore considered non-abrasive. The friction should be such as to cause only very mild inflammation, barely pinking up the surface. We found that by design it was possible to make friction faces that provide significant amounts of frictional resistance to reciprocally sliding without

damaging and inflaming the skin, and more is said about the design of the friction face later herein.

In particular, when pressing a friction face against the skin, it is important to avoid areas with high contact pressures sufficient to damage the skin. This is overcome by evenly distributing a relatively low pressure over a relatively large area, by use of a stiff support behind the friction face.

When compared with lightly scratching the skin with a finger nail the friction face used in the procedure causes much less inflammation, because of the very small area of contact of a finger nail the pressure is actually high enough to cause a histamine reaction. Histamine is a biogenic amine chemical involved in many complex bodily functions; one of which is a local immune responses if the body senses an injury when it dilates blood vessels in the dermis and hypodermis regions to give a localised red inflamed appearance on white skin.

The sliding of the friction face is most effective using a reciprocating action, which means a back and forward motion, while progressively moving slightly sideways to traverse large areas, the reciprocating action should be applied in the general direction of the underlying muscles so that they are stretched and compressed through the skin. On the face and neck the muscles are mostly aligned vertically, running down over the forehead and across the cheeks and under the jaw and down and across the neck. The alignment around the mouth and below the nose and around the eyes becomes very complex and these tend to be laterally orientated. Therefore the friction should generally be applied in the up down direction on the face except for the lower face where it can be applied in a random or circular rubbing motion. It is beneficial to follow the deep crease lines.

The friction face encounters resistance to sliding when placed and slid against skin. This resistance to sliding is the friction force and denoted by F. Friction is understood to mean the resistance encountered when sliding one surface over another. The term above average friction therefore means a level of friction greater than normal friction. Normal friction is understood to mean those levels of friction normally encountered using conventional materials, for example the friction experience by rubbing dry hands together is considered normal, whereas rubbing hands wearing rubber gloves would produce greater

or higher friction. Some materials, especially rubber based materials, and most preferably, polymeric materials containing polyurethane or silicone rubber, as explained in detail later herein, are capable of developing coefficients of friction in excess of 0.5 when sliding over the stratum corneum (skin). These materials being suitable for physically treating the skin with the procedure that pulls at the skin as the friction face slides over it. The resultant friction coupled forces (stress) elastically extend the skin, stretching both the skin and the connective tissues and muscles connected thereto.

To apply the procedure the friction face is held in contact with the skin and a second sideways lateral force is applied to the friction face sufficient to slide the friction face against the skin. The applied lateral pressure must overcome the resistance to sliding caused by the friction, and especially the mechanical interlocking between the friction face roughness and the skin and hairs thereon. The magnitude of the laterally applied force will depend upon the contact pressure and the contact area. The actual relationship is complex and it does not always appear to follow the classical laws of friction between solid sliding bodies, probably because of the very high levels of physical deformation of the skin and hair causing interlocking.

The classical approximation of the force of friction known as Coulomb friction is $F=\mu R$ a mathematical relationship, where F is the friction force and R is the reaction force of the skin which is equal and opposite the applied normal force maintaining the sliding face in contact. μ is the coefficient of friction a constant for particular conditions, μ is a dimensionless quantity that is constant for a given set of conditions, and is determined by experiment. In mechanics, this figure matches theory to observed results and bears no relation to the actual causes of friction. It indicates the amount of friction that occurs between different combinations of sliding materials. Conventionally there are two values for μ, one for overcoming the static resistances and kinetic which is a lower figure and is that required to maintain sliding. The symbols for these are μ_s for static values and μ_k for kinetic resectively.

The procedure involves the steps of first pressing the friction face against the skin to induce reaction force R and then applying a lateral force F to slide the face against skin to provide sufficient friction therebetween to laterally exercise nearby cutaneous and subcutaneous tissues. By way of a

guide the following figures are quoted as being representative of the forces involved in implementing the procedure on and about the human face.

In treating human lips, the reaction force R results from applying a force in the range 0.01 to 0.3N normal to a sliding interface area of between 100 and 300mm^2 , which is typically the area of a circular lipstick dispenser. In treating the female face, the reaction force R results from applying a force in the range 0.01 to 4.00 N normal to a sliding interface area of between 700 and 2500mm^2 , which is typically the contact area of a deodorant stick.

In applying a shaving lubricant to a male human face, the reaction force R results from applying a force in the range 1.00 to 12.00N normal to a sliding interface area of between 1000 and 3000 mm^2, which is typically the area of a traditional shaving brush.

In treating a male neck and body the reaction force R results from applying a force in the range 1.00 to 10.00N normal to a sliding interface area of between 1000 and 5000 mm^2.

The range of typical contact pressures experienced in the above applications are calculated and shown in the following table:

	min force newtons	max force newtons	Min area sq.mm	Max Area sq.mm	min pressure N/sq mm	max pressure N/sq.mm
Female lips	0.01	0 3	100	300	3.33×10^{-5}	0.003
Female face	0.1	4	700	2500	0.00004	0.0057
Female neck/body	0.1	6	1000	3000	3.33×10^{-5}	0.006
Male lips	0.01	0.04	100	300	3.33×10^{-5}	0.0004
Male face	1	12	1000	3000	0.00033	0.012
Male neck/body	1	10	1000	5000	0.0002	0.01

The overall contact pressures at the sliding interface due to the procedure will therefore range form 3.33×10^{-5} to 0.012N/mm^2. The actual contact pressure at a given point will vary within this range during sliding, the variation caused by unevenness and varying stiffness of a mammalian body.

In vivo frictional properties of human skin have been measured in studies of prosthetic attachments and hand grip and the following figures are quoted by way of a guide, although they do not specifically refer to the same conditions pertaining in the procedure, they provide a useful reference. Typical average figures are quoted by Zhang M and Mak AF of The

Rehabilitation Engineering Centre, The Hong Kong Polytechnic University, Kowloon published in Prosthet Orthot Int 1999 August 23 (32) pages 135-41 as follows: "In vivo frictional properties of human skin and five materials, namely aluminium, nylon, silicone, cotton sock, Perlite, were investigated. Normal and untreated skin over six anatomic regions of ten normal subjects were measured under a controlled environment. The average coefficient of friction for all measurements is 0.46+/-0.15 ($p<0.05$). Among all measured sites, the palm of the hand has the highest coefficient of friction (0.62+/-0.22). For all the materials tested, silicone has the highest coefficient of friction (0.61+/-0.21), while nylon has the lowest friction (0.37+/-0.09)".

Another source Buchholz B, Frederick LJ/. An investigation of human palmar skin friction and the effects of materials, pinch force and moisture. Ergonomics 1988; 31(3):317-325 quote similar Coefficient of Friction for skin that broadly agree with the above as follows:
Coefficients of friction for skin sliding against various materials:

Material	Dry	Moist	Combined
Sand Paper (#320)	--	--	0.61 + 0.10
Smooth Vinyl	--	--	0.53 + 0.18
Textured Vinyl	--	--	0.50 + 0.11
Adhesive Tape	0.41 + 0.10	0.66 + 0.14	--
Suede	0.39 + 0.06	0.66 + 0.11	--
Aluminum	--	--	0.38 + 0.13
Paper	0.27 + 0.09	0.42 + 0.07	--

The above test results were obtained by standard mechanical methods under controlled clinical conditions and are provided herein as a guide for μ_k. The data they were not obtained from the human face and neck, the area of most interest herein, but were obtained from tests on the hands and inside of forearms and neither was the friction face similar to that used in the procedure.

Our tests showed a wide range of variation of μ_k, due firstly to variations of the skin itself and secondly to the environmental conditions pertaining during the tests. For example, friction tests on the male human face showed a huge spread ranging from 0.7 to 1.8 for μ_k. due to beard stubble that mechanically engaged (interlocked) with the sliding friction face.

Thus friction was anisotropic because the beard grows downwards, thus friction was greater on the up stroke.

It is difficult to precisely define the skin condition as either dry or moist, and this influences μ_k. In practice, the skin conditions are likely to vary over an area being treated with the procedure; therefore, the figures quoted are a guide for μ_k based on the assumption that average skin conditions will have some slight amount of moisture present but the skin feels dry to the touch.

From the quoted references, hereinbefore the average figure for μ_k for skin in sliding contact with a range of materials appears to be about 0.5. Our tests with a range of friction face materials indicate a figure above this for satisfactory application of the procedure. Therefore, the term 'above average friction' is understood to mean $\mu_k > 0.5$. Consistent measurements of $\mu_k > 0.5$ were obtained between a friction face and freshly washed female facial skin that was rinsed and dried with a towel, the humidity being typical of a washroom of about 80% and the temperature being 20°C. The friction face was clean and dry when tested against the washed skin, hence no lubrication was present on either the skin or the friction face during this test. There was little evidence of anisotropic behaviour.

In the procedure, and as previously noted, there is the possibility of snagging of hairs and/or high levels of mechanical deformation due to interlocking between the skin and the roughness of the friction face. Interlocking raises the level of sliding friction above the average figures quoted above for sliding friction, which friction is necessary to provide sufficient exercise to nearby cutaneous and subcutaneous tissues and muscles. A relatively higher level of friction will also be maintained in the presence of a friction changing compounds providing the introduced compounds are not so viscous as to prevent interlocking.

Clearly, if the reaction force R spreads over too large an area then the local pressure at the sliding interface will fall, a point is reached where there will be insufficient interlocking, and friction falls below the level for effective exercise.

Thus, the area of sliding contact must be sized to exercise a usefully large area without damaging the skin, but not so large as to not generate insufficient or inconsistent friction. The nature of the friction face has large

influence on the effectiveness of the procedure. By making the friction face compliant yet stiffer towards its centre it will follow the skin profile and allow the actual contact pressure to be maintained reasonably uniformly.

The direction of the forces resulting from the frictional coupling between the friction face and skin is predominantly parallel to the skin. These forces therefore are tugging at the outside of skin trying to slide the skin over the internal body parts. The skin is anchored to the skeleton to prevent it slipping and in particular, around the face and neck, the anchorages are via muscles some of whose shapes are visible as bulges through the skin. These are known as the expressive muscles, and the procedure described herein appears highly beneficial at stressing these muscles with the effect of inducing beneficial expansion or hypertrophy. Hypertrophy describes the increase of the size of an organ. According to Wikipedia, an encyclopaedia made available to internet users by Wikimedia Foundation Inc., hypertrophy should be distinguished from hyperplasia, which occurs due to cell division; hypertrophy occurs due to an increase in cell size rather than division. It is most commonly seen in muscle that has been actively stimulated, the most common method being exercise. Thus, by use of this term we mean simply an increase in muscle size due to exercise, the exercise resulting from frictional coupling with the friction face.

The term cutaneous as used herein describes skin, an organ of a mammalian body and matters relating thereto, existing on, or affecting the skin. A cutaneous reaction means for example in relation to this procedure, an increase in blood supply to the dermis and hypodermis because of exercise due to frictional coupling. A sub-cutaneous reaction is understood to mean, in relation to this procedure, the effect of the exercise on a muscle connected to the skin and its associated connective tissues in the hypodermis region.

The friction body used to implement the procedure may take the form of a sheet or a pad, the body shaped and sized for holding by hand or more conveniently mounting on a hand holdable tool. The friction body is resilient and carries a friction face thereon, the friction face bounded by dimensions in the x and y planes and the body with thickness in the z plane.

To provide the desired sliding friction characteristics, the friction face is made rough and stiffer than skin and is flexible and has many friction contacts

(elements). A friction element is an individual sliding contact, one of an array making up the friction face. Thus, the friction face has an array of flexibly interconnected friction elements, which friction elements are also flexible themselves and are made with polymers. The friction elements mainly oriented in the x and y plane.

To give the body a lofty open structure that is flexible and resilient, it is constructed with thermoformed film carrying embossments, a foam or a non-woven web, or combinations thereof.

The friction face is usually porous so that matter held absorbed within the pad transfers onto the skin during sliding. Equally, material may transfer from the skin into the pad during sliding; or there may be circumstances where material is initially transferred out from the pad and after mixing with dirt or particulate during continued sliding contact, the thickened residues then transfer back into the pad. If the friction face is made of film then it may not be porous.

To facilitate the application of pressure to the friction body and hold it in light contact with the skin, the body is preferably mounted on a stiff support, the support face is part of a tool, the tool support face is stiff and with similar x and y dimensions to the body and with formed features in the z plane. The shape of the support matches the body and the support may be equally stiff in both x and y planes or at least stiff in one plane and less stiff in a second plane, the arrangement adopted depends on the application. Smaller pads are usually supported with stiffness in both x and y planes. For use on large limbs, a blade like tool may prove more practical because it is larger, allowing longer sliding action somewhat similar to the action used in plastering a wall or ceiling. These blade like friction faces being stiffer along their longest axis.

If a tool is used to mount the friction face, mechanical members join the body support to a holdable area distant from the friction face, through which members the operable forces to slide the friction face are applied.

The size and shapes of the support and friction faces are matched and they are generally symmetrical in the x and y planes to avoid uneven applications of pressure. Their shapes are made regular so they can be divided into equal sectors. Their actual shape being either: a rectangle, a triangle, a circle or an oval or some combination thereof.

The support face may be shaped in the third dimension – the z plane, to make it more convenient to use. The shapes being either a radius or chamfer around the edges of a flat face and/or a spherical or conical projection from the face or an array of protrusions.

Pads for applying the procedure for shaving, especially to the face and neck are preferably made with lofty non-woven fibre web because the fibres provide excellent grip by interlocking with unshaved stubble. Pads for applying the procedure to reminder of the body where the connective tissues are somewhat more elastic may be either made with soft high grip films, either flat or formed, foams or fibre webs or combinations thereof.

If the body carrying the friction surface is made with fibres it may be in the form of a woven, a knit or a non-woven web, either a thin hydro-entangled, spun-bond or melt-blown into thin wipe like material, or a thicker needle punched felt like web or a lofty resin bonded open structure more typical of scouring pads or some combination of layers of these. The layers may also include natural fibres such as cotton. The preferred materials are fibres, either staple or continuous, formed with polymers selected from the group consisting of polyolefins, polyamides, polyesters, polycarbonates, polystyrenes, thermoplastic elastomers, fluoropolymers, vinyl polymers and blends and copolymers thereof.

A typically lofty low density web suitable for applying the invention is made with crinkled staple fibres of lengths of between 0.2cm to 7cm or with longer (virtually continuous) straight fibres, the fibres coupled by needle punch entanglement, adhesive or resin bonded, or thermal bonding by for example hot air lance – these webs being typical of those used for skin contact use such as make-up removal. They may take the form of a single or multilayered stack, creped or pleated shaped to suit the purpose.

The friction body may comprise a thin layer of non-woven material laid over a resilient sponge layer, preferably a reticulated foam which mounts onto a tool support face, thus the friction body of the tool can be layered.

An alternative construction using thin non-woven web provides circular pads with significant thickness. This construction involves laying out one or more sheets then tightly rolling the sheets into a roll that is taped and then sliced into discs. The rubbing face comprising the edges of the wound

material, hence if layers of dissimilar materials are rolled and sliced then the friction face will comprise of more than one material vertically interleafed.

The sliced off wound pads are made softer by cutting slits into the friction face, with either a cross hatch or wagon wheel pattern, which creates a brush like structure that is less prone to snagging hair especially long unshaved beard stubble.

Similar cross cuts can be made into lofty fibre webs to adjust its friction surface, which again will reduce snagging. The cross cuts when they extend deep into the web leave a matrix of upstanding strips of web material that again act like brush elements during sliding and reciprocating rubbing. The cross cuts adding to loftiness and reducing stiffness of the rubbing face. The effect of this is to moderate friction by reducing the potential for interlocks to form, especially in the presence of long hair.

The actual characteristics of the friction face can vary widely between applications of the procedure. For example male human skin is somewhat tougher than female. It is difficult to provide precise guidance on the most suitable density and stiffness of friction body material, but as a guide for use on a male face, for applying shaving soap, a lofty non-woven web of resin bonded non-woven nylon with a density of 0.065gm/cm^3 made with a fibre of 10 micron diameter fibre was satisfactory. The material had a natural roughness of about 0.75mm Ra. The material should have some resilience so that it can spring into and out of detents in skin roughness. A similar pad for exfoliating and applying moisturiser to a female face used 0.050 gm/cm^3 and the fibre thickness was 7 micron.

The reference to skin stiffness generally means the average stiffness of the skin over muscle. However, there are parts of the body like elbows or knuckles where the skin is in virtually direct contact with bone and therefore there is no subcutaneous deformation. To cope with bony areas resilient tools are required that are more compliant so they are able to adopt the shape of the bony area and prevent the contact pressures rising to levels where the skin might be damaged.

If the friction pad is made with film, the film can either be laid over a flat or formed foam and then mounted on to a backing or direct onto a tool support

face. If a formed film is used they again can be formed and mounted onto a backing sheet or attached direct to the tool support face.

High friction flat and formed films may beneficially use thermo plastic elastomers (TPE). These are blends of plastics (usually olefins) and synthetic rubbers (often urethanes) and in particular, this is known as thermo plastic urethane (TPU). Among their attractive features are a warm high grip feel on skin, they have a high natural coefficient of friction on skin which can be raised further with the introduction of clean (soap free) water. This material with a density of 1.2 does not float but is attractive for its dielectric heating properties that are helpful during thermoforming. It is available with a useful hardness (stiffness) range quoted as typically 80 to 85 on the shore A scale. Formed sheet made with TPU in thickness ranging from 50micron to 400 micron proved very durable and soft to touch with significant elasticity. They always recovered their original form after severe crumpling during use and are preferred for applications where scraping is unacceptable since there was no evidence of densification or crystallisation thus no hard scraping edges were formed with TPU's. These materials are available from Epurex Films Gmbh, a Bayer Company

The Poly [styrene-(block)-ethane-co-butane-(block)-styrene] (SEBS) materials are amenable to formulation manipulations that provide a wide range of Shore hardness from 30A to 90A.These materials also have soft high grip feel and with hardness in the range 50A to 70A they are of practical use for friction pads.

Improved chemical compatibility is available with thermoplastic vulcanised materials (TPV) or thermoplastic natural rubber (TPNR) which is produced by blending natural rubber with PP and the material is thermoformed at temperatures similar to PP. TPV is partially vulcanised dynamically during blending whilst TPNR is said to have no cross-linking of the rubber. The TPNR with higher natural rubber content is the softer product. Both have the processing characteristics of a thermoplastic material and functional properties of a vulcanised rubber. Hence both materials are thermoformed on the same tooling as used for PP and PE, but the formed sheet product behaves like vulcanised rubber. TPV and TPNR materials are preferred for use on skins vulnerable to infection. An example of these are the 8000 series Santoprene (registered trade mark) thermoplastic rubbers supplied by Advanced Elastomer Systems, an Affiliate of ExxonMobile Chemicals, 388 S. Main Street, Akron, OH 44311 USA, which materials are

said to be USB class 6 compliant and this means they are approved for use with exposed traumatised bodily tissue and fluids in the USA. The same company supplies a product with superior low gas permeability called Trefsin (registered trade mark), which has lower permeability and therefore is superior for long term shelf storage when storing fluids within the cavities of the formed sheet. Generally materials with Shore hardness in the range 50A to 60A are preferred for treating sensitive skin.

The procedure has benefits for applying acne treatments where it provides useful mechanically enhanced skin cleaning as it topically applies antiseptic lotions. By using a series of preloaded pads a prescribed course of treatment can be packed in a single package. It is already known that non-woven materials in the form of pre-wetted wipes such as the "Stridex" (registered trade mark of Bayer Corp., Consumer Care Division, Myerstown, Pa. USA) or the teachings of US 5,879,693 in which the acne pad itself is described as 75gram 149-189 tight waffle Novonnette material, in which each pad is impregnated with 1.56 gram of the treatment material. Acne is an generic term for a number of cosmetic skin disorders associated with hair follicles treated by topical medications, which in essence are antiseptic cleaning compounds. It is important that the treatment is applied in a consistent disciplined process and once applied that the potentially contaminated treatment material is carefully disposed of.

The sliding motion used in the procedure may be simply stroking in a single direction or it may involve a reciprocating action, either back and forth or following some more complex pattern. Alternatively, it may be entirely random in nature and the user will decide the actual motion. In some cases, it is beneficial to assist the motion with mechanical means, such as a motor driving an eccentric weight or a powered vibrator. The power source is most conveniently electric from batteries, but may also be mains powered or mechanically driven by clockwork or from a pneumatic source.

A specific embodiment of the invention for sliding a non-aggressive surface against human skin to exercise nearby cutaneous and subcutaneous tissues and muscle and induce hypertrophy therein while applying a shaving lubricant to the skin is now described by way of examples, with reference to the accompanying drawings in which:

Figure 1 illustrates a cross section view of skin in frictional contact with a non-aggressive fibre body.
Figure 2 illustrates the procedure, showing how the sliding friction face stresses the cutaneous and sub-cutaneous tissues.
Figure 3 illustrates by way of an example how the procedure is implemented with a tool used to exercise facial tissues while applying shaving lubricant.
Figure 4 illustrates by way of an example how the procedure is implemented with a bladed tool that exercises cutaneous and subcutaneous tissue while applying shaving lubricant to the leg.
Figure 5 illustrates by way of an example a stick tool for implementing the procedure in which dispensable pads are impregnated with a compound.
Figure 6 illustrates by way of an example a tool with fluid storage and dispensing means for implementing the procedure.

Figure 1 shows a simplified cross section view of mammalian skin and identifies the layers. The stratum corneum **1** is the outer horny surface of the epidermis **2,** which is the outermost layer of the skin. The epidermis **2** is between 0.07 and 0.12mm thick and consists of up to 15 layers of flat platelets of dead or dying cells of keratin **3** joined with a flexible lipid (to small to be discernable on a drawing of this scale). Lipids act like flexible glue like seals holding the keratin platelets together and creating a barrier layer that keeps out dirt and unwanted fluids and protects the dermis **4** – the living part of the skin. The dermis **4**, is a spongy leathery mass typically about 1mm thick in older skin but up to 2mm thick in young skin. The dermis **4** consisting mainly of fibrous collagen, a protein that comprises 70 to 80% of the dry weight of the skin and gives the dermis its mechanical and structural strength. Elastin makes up the balance and provides the skin with its elastic properties, making it possible to recover from up to 50% extension without permanent elongation. Chemically bound water is held in the dermis and gives young skin a healthy plump look. This water is progressively lost during ageing and this largely accounts for the shrivelled wrinkled effects associated with skin thinning in old age. The dermis **4** has a blood supply **5** to its lower level. A hair follicle **6** reaches down towards the third layer, the hypodermis **7**, where the hair follicle is supplied with nourishment that enables it to grow. The dermis

also carries nerve ends (not shown) that provide touch sensation and sebaceous glands **8** and sweat glands **9**. The sebaceous glands produce a waxy secretion called sebum, which helps moisten and waterproof the skin. The sweat gland excretes a compound that is mainly water, which when present influences rubbing friction. The dermis **4** is joined to the epidermis **1** by an irregular grooved transitional region **10**. The hypodermis **7** is a gradual transition layer and is also described as the basal region or layer, which acts as the anchor layer and holds the skin in place relative to the skeleton. Skin is mostly linked to the skeleton by muscle **11** and adipose tissue, which is mainly fat – it is these connective tissues, adipose and muscle tissues that are referred to in the specification as the subcutaneous tissues. Friction face fibres **12** are shown pressing against face **1**, this deforms the skin inwards at **13** to form an indent that acts as an interlock that resists lateral sliding. The hair **6** is shown surrounded by fibres **12** and **14** so the hair **6** is interlocked and will further resist sliding. Finally, there will be molecular attractions between the material of the friction face fibres **12** otherwise referred to as friction elements where they touch the skin, and these attractions alsoresist sliding.

Figure 2 illustrates the procedure by showing a simplified cross section through a section of tissues in which there is a single muscle **27** linking the hypodermis **28** to a bone **29**. The diagram shows a friction pad **20** supported by a face on a tool **21** as it is pressed against skin in direction of arrow **22** to form a frictional interface **23.** An external lateral force **25** is then applied to slide the friction pad in the direction of arrow **24**.

The frictional interface **23** is shown wavy to represent the rough face of the pad **20** deforming the skin **26** and thereby forming high friction interlocks between the friction pad **23** and deforming skin **26,** the interlocks due to the wavy deformation of the skin **26** resist sliding.

The muscle **27** is internally tensed in the direction of arrow **30.** An external tensile stress is applied by the sliding motion of pad **20** in direction **24**, which stretches the muscle **27** in the direction of arrow **31.** The stretching exercises the muscle, reacting via the tendon **32** that is firmly anchored to the bone **29**.

Figure 3 illustrates an example of how the procedure is used to apply shaving lubricant to the human face and thereby exercises the facial muscles while preparing to shave. The shaving lubricant is applied to the pad of a friction tool **40** at a friction face **41**, which is used to slide or rub along the general alignment of the major muscles of the face. The friction tool pushes and pulls and thereby stretches the skin and the muscles attached thereto and exercises the muscles. Friction tool **40** is here shown applying lubricant, such as shaving lather to the chin by sliding in the up/down direction shown by arrow **42**. Arrow **43** shows the direction of sliding for the side burns. Arrow **44** shows the direction for treating the cheeks and **45** around the mouth. Arrow **46** shows the motion under the chin and down the neck. Because there are many overlaying minor expressive muscles around the lower part of the face, and these are orientated in various directions, this part of the face may be rubbed randomly with the tool **40** in both circular and reciprocating motions. All the facial muscles benefit from the exercise because they are joined directly to the skin and can be seen bulging through the skin. The friction face **41** is a lofty non-woven web that develops most of its frictional coupling by interlocking of the facial hair stubble on the up sliding strokes. Generally the more vigorous the sliding and the more extensive the area treated the greater the improvement in appearance. The face will show improvement because the subcutaneous expressive muscles are expanded, giving the appearance of lifted cheeks, reduced deep crevices and reduced neck flab firmer and firmer tighter skin overall. These effects start to be noticed after the first few treatments, thereafter a steady improvement occurs up to between fifteen and twenty shaves, after which the muscles are maintained in an exercised state providing the process is repeated at least every other day. It was found beneficial to treat the entire face including the forehead with the friction tool. This can be done either with the shaving lubricant or after shaving with a separate cosmetic preparation such as a moisturiser or very beneficially with a chemically active anti-wrinkle cream.

Figure 4 by way of a further example this diagram illustrates the same procedure applied to a female leg **54** with a large area blade like tool **50** in which the rubbing pad **53** is attached to a shaped bladed face rather like that

on a builders trowel. A blade **50** with means of holding like a handle **51** is used to slide in alternating directions as shown with arrow **52**. The tool blade **50** must be stiff in at least one axis preferably along the axis of the handle **51** to allow sufficient contact pressure to be applied. A bladed tool with a large blade area **50** can carry a non-woven fibre pad **53**, or a reticulated foam pad or a film pad. The support face **50** is generally flat. It may carry a friction face in the form of an embossed thermoformed structure made with a high friction rubber-like material. The procedure is particularly useful for treating subcutaneous adipose tissues that tend to collect at the back of female legs **54** in which case a polyurethane friction face is used with water to produce a vigorous stick/slip action that vibrates deep into the adipose deposits, causing internal wear and erosion.

Figure 5 illustrates a tool for implementing the procedure in which a container is sized and shaped for gripping by hand, roughly 35mm diameter and 100mm long.

A tubular plastic holder **60**, described as a propel/repel stick holder and based on a design used for dispensing deodorant sticks has a rotary knob **61** coupled to an internal screw (not shown) and upon turning **61** the contents stored within the tool body **60** are forced upwards. A column of pads **62** are placed in the holder **60**, the pads may be interlinked with ties or adhesives run down the central screw hole **67**. Separators **68** made with plastic sheet placed between the pads to prevent contamination filtering down through the stacked column **62** during storage. The pads may be stored dry or pre-impregnated with a compound such as shaving lubricant. A cap **63** has means of attaching a pad, such means may be a contact adhesive or preferably an array of hooks **64** that engage with loops of fibre within a pad **65**. The procedure for using the tool is to remove the cap **65** from the body **60**, turn knob **61** to expose a new pad **62**, invert cap **63** and press the array of hooks **64** against the new pad **62** to engage it. Replace the cap **63** onto the body **60** with new pad **65** on top of the cap. The tool may then be used as shown in preceding example **Figure 3**. When the pads are dry the shaving soap is either applied by dipping the tool with pad attached into a traditional soap tub, or a shaving lubricant is somehow dispensed onto the pad prior to use. Alternatively and most

conveniently the pads **62** are pre-impregnated with lubricant, for example soap, and a separation disc **66** is placed between the impregnated discs to allow them to be easily separated as the are dispensed. The soap in the pad **65** should be soft enough to allow the hooks **64** to penetrate. For hygiene purposes it is recommended that each pad is discarded after a single use, especially if the friction pads are non-woven fibre.

Figure 6 illustrates a further example of a tool for implementing the procedure, the tool having a more rugged long life friction face **70** mounted onto the cap **71**. The friction face shown is an example of a thermoformed array of protrusions thermoformed from flat a sheet of thermoplastic urethane. A seating for the cap **72** covers a fluid storage cavity within body **73**. In use the cap **71** is removed and fluid such as shaving lubricant is dispensed onto pad **70** by turning knob **74** to force the fluid out of slots **75**. The cap **71** is then slid down over area **72** and retained; the tool is used to vigorously rub the skin prior to shaving generally as described in the earlier example with reference to **Figure 3**. For other applications such as shaving legs or applying cleaning and conditioning treatments, the outside areas **76** on the tool body **73,** which is used primarily as a holding area, may also be partly or fully covered with a friction surface **76** and these are useful for applying treatments to large areas of skin. If the container walls **76** are also used as rubbing faces then for practical purposes fluid must be dispensed form slits **75** directly onto the skin. The friction face **70** should be rinsed clean and dried after use to prevent bacterial contamination during storage.

Example of the procedure

Example of face shaving and grooming trial

Half a 68 year old male's face was shaved every other day for 30 days using the procedure described hereinbefore. The other half of the face was shaved at the same time using conventional wet shaving. The unshaved areas of the face of the forehead and around and below the eyes and were treated with a moisturiser also applied with the same procedure as used on the test side of the face.

The shaving procedure was to wet the entire face with warm water. Using a tool as illustrated in Figure 5, applying a foaming shaving gel to the tool and using as illustrated in Figure 3. The skin was exercised vigorously with alternating sliding strokes as illustrated in Figure 3, for about 1 minute to create a full lather. The gel was then applied to the other half of the face by finger in the recommended way and the face was shaved, the entire face shave taking about six minutes.

After shaving the procedure was repeated using a similar pad to apply moisturising lotion to the unshaved areas of the half of the face being tested with the procedure. The exercise was applied for about one minute to the fore head top of the cheeks and around the eyes.

After 30 days and for a period up to 60 days the whole face was shaved using the procedure.

Results.

After three shaves the half of the face subjected to the procedure appeared fuller, tighter with less chin flab – accessed by pinching matching areas on opposite sides of the face simultaneously, the loose flabby tissue reducing so that pinched volumes reduced by 70% after five applications of the procedure. The effectiveness of the procedure appears to be related to the vigour with which the procedure is applied and this in practice is limited by physical discomfort.

After five shaves, the depth of skin creases around the mouth and chin appeared to have reduced by between 20 and 40% in depth and the skin over the cheeks showed less wrinkles.

After 15 shaves the process stabilised and the improvements were maintained. The stiffness of the skin in the cheek below the eye bags appeared greater on the treated side and did not wrinkle as readily, which was attributed to the skin having thickened. The part of the face subjected to the procedure remaining noticeably more muscular and the fleshy part of the cheek appeared lifted upwards towards the eye. The expanded muscles of the cheek were felt slightly within the mouth and there was a general improvement in appearance down the jaw line and neck, where a pinch test showed significantly (estimated at 90%) less flab since using the procedure.

The moisturiser used to treat the unshaven areas did not have active anti-wrinkle ingredients. A similar pad was used but the friction levels were lower due to the different rheological properties of the moisturiser and there was no interlocking due to hair stubble. Hence the unshaved areas actually experienced less exercise, nevertheless after 15 applications an independent beautician commented that the frown lines were slightly reduced, the eye region was less wrinkled and the skin pours appeared finer.

After 60 days the side shaved for 60 days with the procedure appeared slightly fuller than the side shaved for 30 days. There was no sign of soreness or skin irritation evident as a result of using the procedure.

The tests were repeated on a 38 year old face with similar results.

Conclusion

As the exercised facial muscles get stronger, they become shorter and flatter, causing the attached skin to appear firmer thus improving the external appearance of the face. The exercise also appears to have thickened the skin and improved its reflective colouring. Generally, the skin on the face felt tighter.

Claims

1. A cosmetic procedure for improving bodily appearance, characterised by

   sliding a non-aggressive surface against mammalian skin to develop friction therebetween sufficient to laterally exercise nearby cutaneous and subcutaneous tissues and induce hypertrophy therein.
2. A cosmetic procedure as claimed in Claim 1 wherein the sliding is done in the presence of a fluid film.
3. A procedure as claimed in Claim 2 wherein the fluid includes a topically applied compound formulated to interact with cutaneous tissue.
4. A procedure as claimed in Claim 2 wherein the fluid includes a compound formulated to assist with cleaning, exfoliating, a depilatory process, a skin conditioning process, an anti-ageing process, a shaving process, an antiseptic process.
5. A procedure as claimed in Claim 1 in which the level of sliding friction is higher than average.
6. A procedure as claimed in Claim 1 in which the kinetic coefficient of friction of the non-aggressive surface is greater than 0.5 when sliding dry.
7. A procedure as claimed in Claim 1 including the steps of:

   pressing a friction surface against the skin with average contact pressures ranging between $3.3X10^{-5}$ and $0.012N/mm^2$ over an area greater than $100mm^2$,

   while maintaining the contact pressure, applying a second lateral force sufficient to slide the friction face against the skin,

   reciprocally sliding the friction face over cutaneous and nearby subcutaneous tissue thereby elastically stretching these.
8. A procedure as claimed in Claim 7 for treating human lips in which the average contact pressure ranges between $3.3X10^{-5}$ and $0.3N/mm^2$ over an area greater than $100mm^2$
9. A procedure as claimed in Claim 7 for treating parts of the human face in which average contact pressure ranges between 0.00004 and $0.0004N/mm^2$ over an area greater than $100mm^2$
10. A procedure as claimed in Claim 1, wherein the sliding of a non-aggressive surface, a friction surface, against the skin is performed with a friction body, which body is resilient and carries a friction face thereon, the friction

face bounded by dimensions in the x and y planes and the body with thickness in the z plane.

11. A procedure as claimed in Claim 10 wherein the friction face used is rough and stiffer than skin and flexible.

12. A procedure as claimed in Claim 10 wherein the friction face used comprises an array of flexibly interconnected friction elements, which friction elements are also flexible and made with polymers and mainly oriented in the x and y planes.

13. A procedure as claimed in Claim 10 wherein the friction body used is a sheet or a pad constructed with film, foam or a non-woven web, or combinations thereof.

14. A procedure as claimed in Claim 10 wherein the friction body is held by hand or is mounted on a tool that is held by hand.

15. A procedure as claimed in Claim 14 wherein the body is supported in use by the face of a tool, the tool support face is stiff and with similar x and y dimensions to the pad and with formed features in the z plane.

16. A procedure as claimed in Claim 15 in which is used a pad support face that is coupled by members to a holdable area distant from the pad, through which members the operable forces to move the pad are applied.

17. A procedure as claimed in Claim 15 where the support face and friction face used are shaped to be equally divisible, shaped either as a rectangle, a triangle, a circle or an oval or some combination thereof.

18. A procedure as claimed in Claim 15 where the support face used has formed features in the z plane such as a radius or chamfer around the edges, a flat face and/or a spherical or conical projection from the face or an array of protrusions therefrom.

19. A procedure as claimed in Claim 10 in which a tool is used for sliding a friction face against skin consisting of a tool body in which a stack of shaped friction bodies are stored in airtight conditions, each friction body with a friction face, the tool with means of releasing friction bodies one at a time via an orifice, for transfer to a support face.

20. A procedure as claimed in Claim 19 in which the stored friction bodies are impregnated with a chemical compound.
21. A procedure employing a tool as claimed in Claim 15 wherein the shaped friction body or the segments thereof are detachably attached to a support face.
22. A procedure employing a tool as claimed in Claim 21 in which the support face used to support the friction pad during sliding is a face on the container or an end cap.
23. A procedure employing a tool as claimed in Claim 19 in which the container used is sized and shaped for gripping by hand and is held and used in a similar way to a propel/repel deodorant stick.
24. A procedure as claimed in Claim 10 in which a tool is used for sliding a friction face against skin consisting of a friction body mounted on the exterior of the tool body with fluid stored therein for dispensing therefrom.
25. A procedure as claimed in Claim 10 in which a tool is used to slide a friction face against skin consisting of a shaped bladed face on a trowel like tool with a friction body attached thereto.
26. A procedure as claimed in Claim 10 in which the tool used for sliding carries a segmented friction face, the segments of which spread laterally outwards when the tool is pressed normal to the skin.
27. A method of exercising cutaneous and sub-cutaneous tissue by laterally deforming the skin with a tool in frictional sliding contact therewith.
28. A method as claimed in Claim 26 for chemically treating cutaneous tissue while exercising subcutaneous tissue.
29. A method as claimed in Claim 26 and 27 wherein the lateral force applied to move the friction pad is provided by an externally powered device.

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Application No: GB0610373.3 **Examiner:** Hayley Yates

Claims searched: 1-29 **Date of search:** 16 August 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 5-10, 14 & 27	US 2001/0020141 A Chahine; see figures 31-33
X	1-11, 14, 25, 27 & 28	US 1723024 A Fisher; see figure 2 and description
X	1, 5-10, 14, 25, 27 & 28	GB 3914 A Baertl; see figures
X	1, 5-10 & 27	GB 2411338 A Gould; see whole document
X	1 & 27	FR 2563728 A Bontemps; see abstract translation and figure 1
X	1, 5-11, 13-17, 21, 25, & 27	JP 08196463 A Yoshisaku; see abstract translation and figures
X,Y	X: 1, 2, 4-11, 14, 25 & 27 Y: 24	GB 1261877 A Kawada; see figures
Y	24	GB 196904 A Van Ess Laboratories; see page 1 lines 15-61

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