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3,288,104

SOAP-ARTICLE INCLUDING ATTACHED HOLDER

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Fig. 1

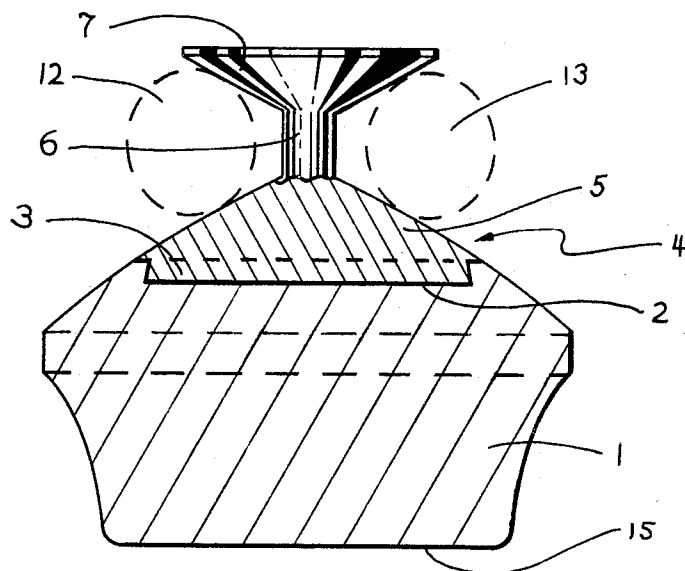
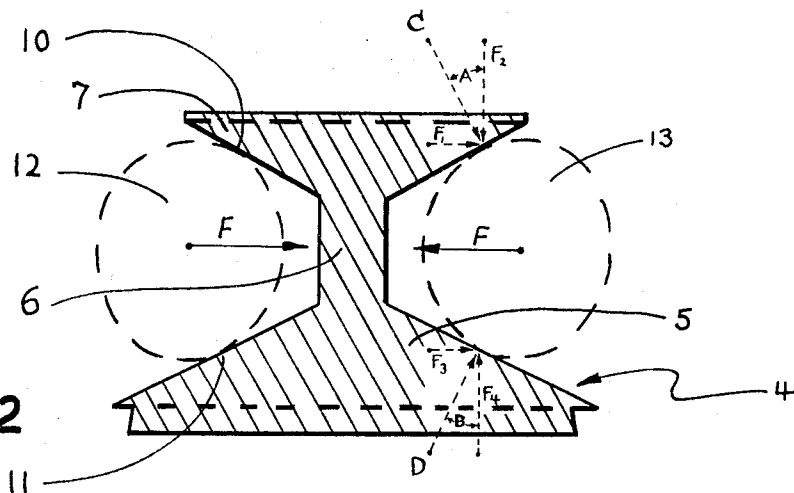


Fig. 2



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SOAP-ARTICLE INCLUDING ATTACHED HOLDER

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9 Claims. (Cl. 118—76)

In my copending application Serial No. 804,283, filed April 6, 1959, now Patent No. 3,100,363, of which this is a continuation in part, there is described a body of material, for example a cake of soap, which is adapted to be held by the hand and to cooperate with an object being treated. The body of material is attached to a member which may be adapted to be held by the hand, said member being attached to the upper surface of said body, the opposed lower surface of the body being adapted for use in cooperation with an object being treated. The member may include a holding means portion which extends generally upwardly in a direction away from the body of material. Said holding means includes a slender stem portion which is made so that it can be held comfortably within the crotch between two adjacent fingers. Usually the upper end of the holding means includes a head portion located generally upwardly from said stem, which head facilitates holding by the hand and supporting of the article. The surface of the body of material adjacent to said member may rest against the under surface of the fingers and the palm of the hand. The ends of the fingers may curve over the outer edge of the article in a comfortable manner.

In the past, bodies of material of a size to be grasped by the hand and manipulated thereby have often been relatively difficult to hold in use. When held for prolonged periods of time, the hand sometimes becomes fatigued. When the body of material is erodable, it becomes gradually smaller in size and is thereby rendered more difficult to hold onto by the hand. Also, when the body contains a material which becomes slippery in use, such as soap, it becomes even more difficult to hold onto in use.

It is an object of the present invention to provide a body of material with a member including a holding means attached to one surface, said holding means being of new and improved design that enables the hand to hold said article more easily and more securely with less effort and with greater safety. This and other objects of the invention will become apparent from the following description when taken in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 is an elevation view, in partial section, showing a body of material and holding means in accordance with the present invention.

FIGURE 2 is an elevation view in section of a holding means being held between two adjacent squeezing fingers in a finger-wedge grip, according to the present invention.

Referring to FIGURE 1, there is shown in partial vertical section a body of material 1 of a size to be grasped by a hand and manipulated thereby, which body may for example be of erodable material such as soap, and which has an upper surface portion 2 attached to the lower portion 3 of the member designated generally by the number 4, said member including a holding means portion 5 extending generally upwardly from the body of material, said body having an opposed (lower) surface 15 for application to an object to be treated. Said holding means includes a slender stem portion 6 extending generally up-

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wardly from said lower portion 3 of the member 4, said stem being sufficiently slender to be positioned comfortably within the crotch of two adjacent fingers of a hand without spreading said fingers to an uncomfortable degree. The holding means 5 is provided with a head portion 7 disposed generally upwardly from the slender stem portion 6 of the holding means to aid in holding the article. The head portion 7 extends laterally a substantial distance out over a portion of adjacent fingers 12 and 13, shown in dashed outline of cross-section, which clasp said holding means within their crotch.

Reference is made to FIGURE 2 which shows in vertical section an enlargement of the holding means described in FIGURE 1. Like reference numerals refer to like parts. The under surface 10 of the head portion 7 and the generally opposed surface portion 11 beneath of the holding means 5 converge inwardly towards said stem so that said holding means will fit snugly on fingers of different sizes, such as 12 and 13. This provides a finger-wedge means of gripping that will be more fully described. This in itself improves the sureness and comfort in gripping the holding means as well as the article to which it is attached.

Said stem is sufficiently slender and the opposed surfaces 10 and 11 are so positioned that the holding means may be clasped comfortably within the crotch of two adjacent fingers of a hand without spreading said fingers to an uncomfortable degree. The two adjacent fingers 12 and 13 are shown squeezing together with an equal and opposite force F. Considering the finger 13 in its mechanical relation to the holding means with which it is engaged, said force F causes the finger to attain an equilibrium position under the action of the reactive opposing forces C and D. The horizontal and vertical components for each of these reactive forces, which necessarily act through the areas of contact between the finger and the holding means, are shown as F_1 and F_2 , and F_3 and F_4 respectively. For equilibrium to exist:

$$F = F_1 + F_3 \text{ and } F_2 = F_4$$

It should be noted that a full-wedging type of handle, as depicted in FIGURES 1 and 2, would not permit the squeezing fingers 12 and 13 to bear on the surface of the slender stem portion 6 of the holding means 5 for the reason that once the sum of the horizontal reactive component forces F_1 and F_3 become equal to F, the fingers 12 and 13, whose opposing squeezing forces must be equal, attain equilibrium in the wedging position described. Note that in FIGURES 1 and 2, fingers 12 and 13 do not touch the slender stem 6. This represents a new and unique type of holding means. This new holding means may be combined with some finger squeezing or gripping of the slender stem portion, this increasing the area of friction contact between the two adjacent squeezing fingers and the holding means, although this would in part reduce the new, pincerslike vertical squeezing force of the holding means on the squeezing fingers. This gripping combination may be desirable when those portions of the holding means that cooperate with the squeezing fingers are substantially a surface of revolution, this gripping combination being helpful in reducing the unit pressure of the upper wedging surface of the head portion of the holding means on the tops of the two adjacent squeezing fingers.

In a basic analysis of the finger-wedging principle, only

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the force applied by the two adjacent fingers, squeezing sidewardly, one toward the other, and the reactive forces thereto exerted by the converging surfaces of the holding means within which these fingers wedge, need be considered. Force C makes an angle A with the vertical while force D makes an angle B with the vertical. These angles are the same as the angles of the average tangent of contact of the finger with the adjacent sloping surfaces of the holding means, with relation to a horizontal plane.

$$F_1 = F_2 \tan A \quad F_3 = F_4 \tan B$$

$$F = F_2 \tan A + F_4 \tan B = F_2 (\tan A + \tan B)$$

$$F_2 = \frac{F}{(\tan A + \tan B)}$$

The ratio of F_2 to F is defined as the "wedging leverage ratio." This ratio reveals that a holding means of the type described can exert squeezing, reactive forces on the fingers as two opposing vertical force components F_2 and F_4 which, as a result of the squeezing force F , can actually cause the holding means to take hold of the squeezing fingers of the hand in a vertical pincerslike grip. This is a new and highly useful result of such importance, whereby a pair of equal reactive component gripping forces are brought to bear in an entirely new direction from the horizontal plane of the two adjacent squeezing fingers, and more particularly completely at right angles to said plane, and which in effect cause the holding means to react by squeezing the fingers in a vertical, pincerslike gripping action, that a clear definition of the relationship of these two forces, directed at right angles, one from the other, should be clearly set forth. This "wedging leverage ratio" of the vertical pincerslike force to the horizontal squeezing force is defined by the equation:

$$\frac{F_2}{F} = \frac{1}{(\tan A + \tan B)}$$

The finger-wedge holding means described makes it possible to obtain an improved and more secure grip between the holding means and the hand. It creates a new pair of pincerslike reactive squeezing force components of the holding means, acting on the fingers, that lie in a plane at right angles to the horizontal plane of the basic squeezing force F exerted by the adjacent fingers. These vertical forces that squeeze the fingers are substantial and may even be made to substantially exceed in value the basic squeezing force F applied by the fingers, even by more than 50%. Or stated differently, within a practical range, the applied horizontal finger squeezing force F may be decreased without causing a decrease in the vertical gripping component forces F_2 and F_4 (which are equal and generally opposite) by reducing either or both angles A and B. These unexpected results, which are highly advantageous and highly useful, are not taught by prior art.

In practice, the converging surfaces of the underside of the head of the holding means and the opposed surface beneath need not be of linear profile in order to enjoy the advantages of the finger-wedge gripping concept. These profile may be concave, convex, or of other configuration. As previously indicated, the more difficult it usually is to hold a body of material under conditions of normal use, the more advantageous can be this new holding means. When the body of material contains soap, said holding means may be used to marked advantage. Soap is defined broadly to include any erodable cleansing material of generally soap-like character regardless of what other substances it may contain such as skin cream, skin moisturizers, medication, etc.

For every design of holding means that includes upper and lower converging surfaces for wedging the two adjacent squeezing fingers, as described, these two inwardly converging surfaces must necessarily extend a sufficient distance laterally from the stem portion of the holding means out over the top of, and beneath the bottom of,

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each of said squeezing fingers so as to make wedging possible, as is evident from the drawing.

It may be pointed out that every such holding means capable of producing this finger wedging result will provide a further distinct gripping advantage when the object is held in certain positions. For example, when the object is held downward with the hand in a substantially relaxed position, the turning moment imparted to the object by the mass of the object, about that portion of the holding means normally gripped between said squeezing fingers, may cause some rotation which results in the surfaces described as 10 and 11 tending to lock to the finger 12, and the corresponding surfaces on the other side of the stem to finger 13.

Thus, there is described a new and unique holding means for an article to be held by the hand which provides important advantages to the user. These advantages are enhanced when those parts of the holding means that engage with the hand are substantially a surface of revolution, which permits the article to be held to best advantage in any position of orientation about its vertical axis. This provides added convenience to the user and more efficient and economical utilization of a body of material that is erodable and which thus diminishes in size during use. It is especially advantageous where the article contains erodable material and where it becomes slippery in use, in which cases added reliance must be placed on the holding means to maintain a secure and comfortable grip.

I claim:

1. In combination, a body of material of a size to be grasped by a hand and manipulated thereby, said body having an upper surface portion; a member extending upwardly from and having a base portion attached to at least part of said upper surface portion of said body, said body having an opposite (lower) surface for application to an object to be treated, said member including a holding means portion having a slender stem portion extending upwardly, said stem being sufficiently slender to be positioned comfortably within the crotch of two adjacent squeezing fingers of a hand without spreading said fingers to an uncomfortable degree, a head portion of the holding means provided at the upper end of said stem that extends laterally a substantial distance out over a portion of said adjacent squeezing fingers, the under surface of said head and the generally opposed upper surface of said base portion of the member being spaced apart a distance sufficient to accommodate the fingers of said hand without spreading two adjacent squeezing fingers to an uncomfortable degree, and generally converging inwardly towards said stem so as to fit snugly on said adjacent fingers, said opposed converging surfaces bearing firmly substantially above and below said fingers in a wedge-like manner that produces two equal reactive generally opposing vertical component forces acting on each of said two adjacent fingers to squeeze firmly said fingers between them for hands having a substantial range of different finger sizes; the center of gravity of the body of material being so located with respect to the central stem portion of the holding means that, with the hand held generally downward, the mass of the body of material produces a turning moment of force about the vicinity of the central holding means portion that lies between said adjacent fingers, which causes a force-couple to be imparted by the combination against the hand, whereby to cause the combination to assume a self-locking grip on the hand, with the hand held substantially relaxed, for hands having the same substantial range of different finger sizes.
2. The combination as in claim 1 wherein the body contains erodable material.
3. The combination as in claim 1 wherein the body contains soap.
4. The combination as in claim 1 wherein the wedging leverage is described by the equation:

$$\frac{F_2}{F} = \frac{1}{(\tan A + \tan B)}$$

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where:

F =squeezing force between adjacent fingers

F_2 =force exerted by holding means in the direction perpendicular to direction of squeezing force F

A =angle which upper reactive force makes with direction of F_2

B =angle which lower reactive force makes with direction of F_2

5. The combination as in claim 4 wherein those portions of the holding means that normally engage with the hand are substantially surfaces of revolution.

6. The combination as in claim 5 wherein the body is erodable and contains soap.

7. In combination, a body of soap of a size to be grasped by a hand and manipulated thereby, said body having an upper surface portion; a member extending upwardly from and having a base portion attached to at least part of said upper surface portion of said body, said body having an opposite surface for application to an object to be treated, said member including a holding means portion having a slender stem portion extending upwardly, said stem being sufficiently slender to be positioned comfortably within the crotch of two adjacent fingers, squeezing one toward the other, of a hand without spreading said fingers to an uncomfortable degree, a head portion of the holding means provided at the upper end of said stem that extends laterally a substantial distance out over a portion of said two adjacent squeezing fingers, the under surface of said head and the generally opposed upper surface of said base portion being spaced apart a distance sufficient to accommodate said adjacent fingers of the hand without spreading them to an uncomfortable degree, and generally converging inwardly towards said stem so as to fit snugly on fingers of different sizes, said opposed converging surfaces bearing firmly and substantially on, above and below, said inwardly squeezing adjacent fingers in a wedge-like manner that produces two equal reactive generally opposing vertical component forces of the holding means acting on each of said two adjacent fingers to squeeze firmly said fingers between them, and wherein those portions of the holding means that normally engage with the hand are substantially surfaces of revolution.

8. In combination, a body of material of a size to be grasped by a hand and manipulated thereby, said body having an upper surface portion; a member extending upwardly from and having a base portion attached to a least part of said upper surface portion of said body, said body having an opposite surface for application to an object to be treated, said member including a holding means portion having a slender stem portion extending upwardly, said stem being sufficiently slender to be positioned comfortably within the crotch of two adjacent squeezing fingers of a hand without spreading said fingers to an uncomfortable degree, a head portion of the holding means provided at the upper end of said stem that extends laterally a substantial distance out over a portion of said adjacent squeezing fingers, the under surface of said head and the generally opposed upper surface of said base portion of the member being spaced apart a distance sufficient to accommodate the fingers of said hand without spreading said two adjacent squeezing fingers to an uncomfortable degree, and generally converging inwardly toward said stem so as to fit snugly on said adjacent fingers, said opposed converging surfaces bearing firmly substantially on, above and below, said fingers in a wedge-like manner that produces two equal reactive generally opposing vertical component forces of the holding means acting on each of said two adjacent fingers to squeeze firmly said fingers between them, for hands having a substantial range of different finger sizes; the center of gravity of the body of material being so located with respect to the central stem portion of the holding means that, with the hand held generally downward, the mass of the body

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of material produces a turning moment of force about the vicinity of the central holding means portion that lies between said adjacent fingers, which causes a force-couple to be imparted by the combination against the hand, whereby to cause the combination to assume a self-locking grip on the hand, with the hand held substantially relaxed, for hands having the same substantial range of different finger sizes as stated above for wedging of two adjacent fingers when said fingers are squeezed together between the described converging surfaces; wherein the effective angle of convergence of the lower surface of said head and the generally opposed upper surface of said base portion, where said surfaces engage the adjacent squeezing fingers, is sufficiently small that each of the equal reactive generally opposing vertical force components exerted by the holding means on each of the fingers substantially exceeds the applied horizontal squeezing force of the adjacent fingers, as defined by the equation for the wedging leverage,

$$\frac{F_2}{F} = \frac{1}{(\tan A + \tan B)}$$

where:

F =squeezing force between adjacent fingers

F_2 =force exerted by holding means in the direction perpendicular to direction of squeezing force F

A =angle which upper reactive force makes with direction of F_2

B =angle which lower reactive force makes with direction of F_2

9. In combination, a body of soap of a size to be grasped by a hand and manipulated thereby, said body having an upper surface portion; a member extending upwardly from and having a base portion attached to at least part of said upper surface portion of said body, said body having an opposite surface for application to an object to be treated, said member including a holding means portion having a slender stem portion extending upwardly, said stem being sufficiently slender to be positioned comfortably within the crotch of two adjacent fingers, squeezing one toward the other, of a hand without spreading said fingers to an uncomfortable degree, a head portion of the holding means provided at the upper end of said stem that extends laterally a substantial distance out over a portion of said two adjacent squeezing fingers, the under surface of said head and the generally opposed upper surface of said base portion being spaced apart a distance sufficient to accommodate said adjacent fingers of the hand without spreading them to an uncomfortable degree, and generally converging inwardly toward said stem so as to fit snugly on fingers of different sizes, said opposed converging surfaces bearing firmly and substantially on, above and below, said inwardly squeezing adjacent fingers in a wedge-like manner that produces two equal reactive generally opposing vertical component forces of the holding means acting on each of said two adjacent fingers to squeeze firmly said fingers between them, wherein those portions of the holding means that normally engage with the hand are substantially surfaces of revolution, and wherein the effective angle of convergence of the lower surface of said head and the generally opposed upper surface of said base portion, where said surfaces engage the adjacent squeezing fingers, is sufficiently small that each of the equal reactive generally opposing vertical force components exerted by the holding means on the fingers substantially exceeds the applied horizontal squeezing force of the adjacent fingers, as defined by the equation for the wedging leverage,

$$\frac{F_2}{F} = \frac{1}{(\tan A + \tan B)}$$

where:

F =squeezing force between adjacent fingers

F_2 =force exerted by holding means in the direction perpendicular to direction of squeezing force F

A =angle which upper reactive force makes with direction of F_2
 B =angle which lower reactive force makes with direction of F_2

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