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Komatsu et al.

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[54] **COMBINED HAIR DRYER AND DETANGLER**

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[73] Assignee: **Sunbeam Corporation,** Chicago, Ill.

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[52] **U.S. Cl.** ..... **132/11 A**

[51] **Int. Cl.** **A45d 24/00**

[58] **Field of Search** ..... 132/11 A, 11 R, 9, 142, 132/139, 34 R; 510/15; 128/32; 74/574; 34/96

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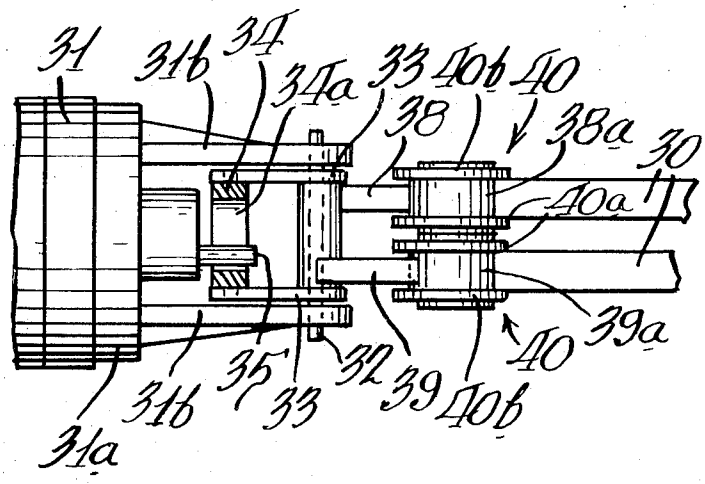
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[57] **ABSTRACT**

A lightweight portable hair dryer is provided with a hair detangling comb consisting of two counter-reciprocating comb members positioned immediately adjacent the air discharge in the hair dryer. The hair dryer and the detangling comb are driven by two separate and independent motors which assure continued high volume air flow in spite of excessive loads being applied to the counter reciprocating combs. The supporting and driving means for the comb are positioned at either end of the elongated hot air discharge slot of the hair dryer.

10 Claims, 5 Drawing Figures



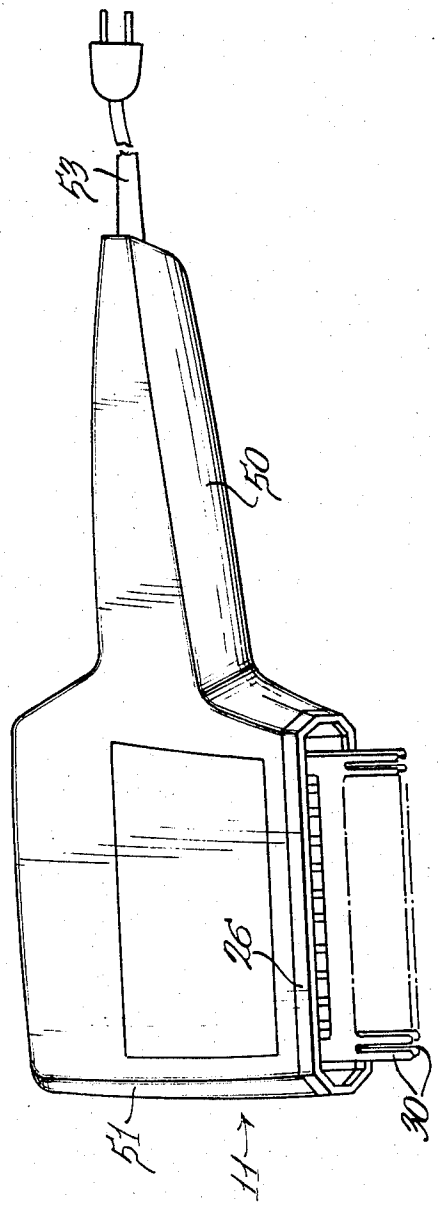

53
50
26
51
30
1

FIG. 1.

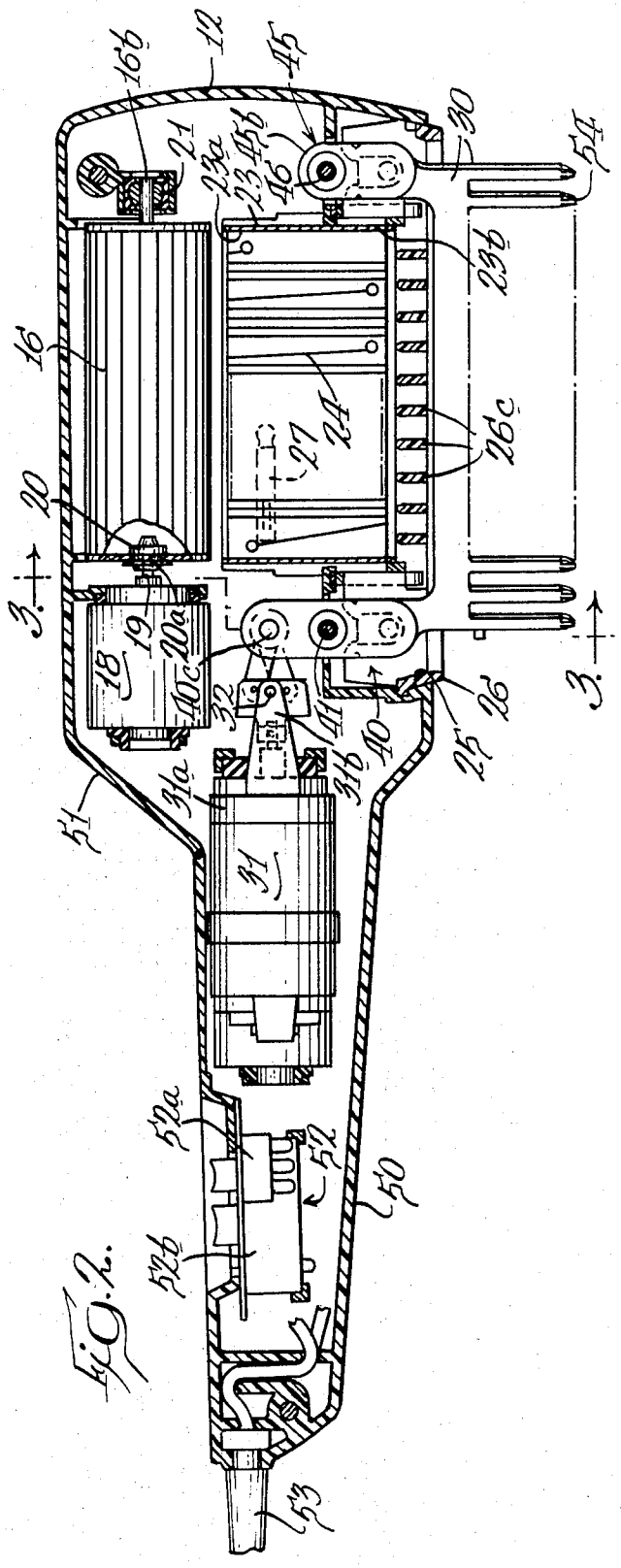

16b
12
45
21
23a
23
45b
46
30
54
23b
16
27
24
26c
20
3
19
18
20a
20c
32
41
40
26
25
3
31a
31b
51
31
52a
52
52b
50
53

FIG. 2.

Fig. 3.

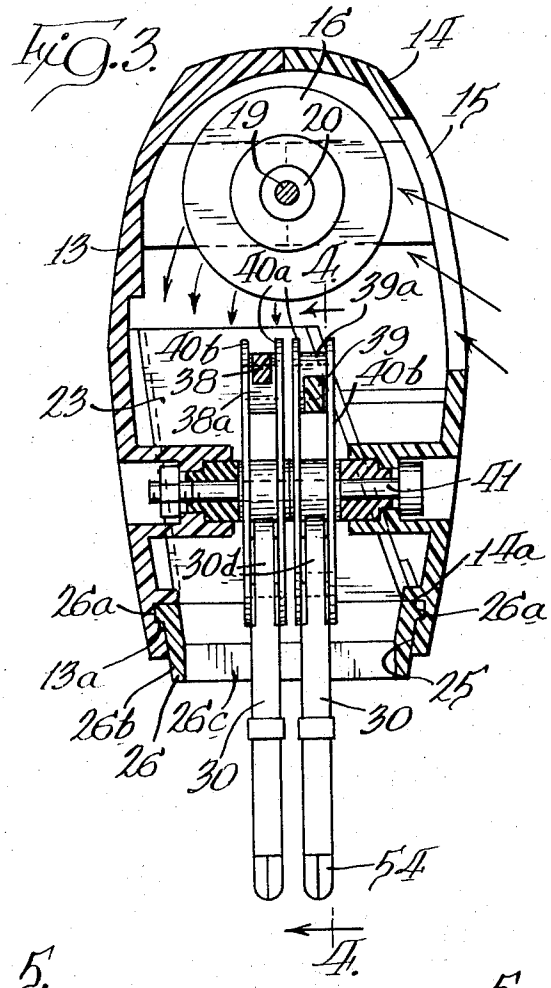
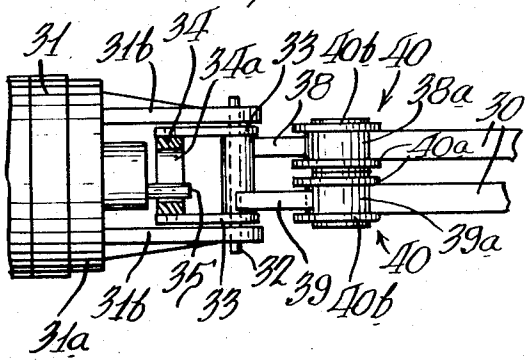
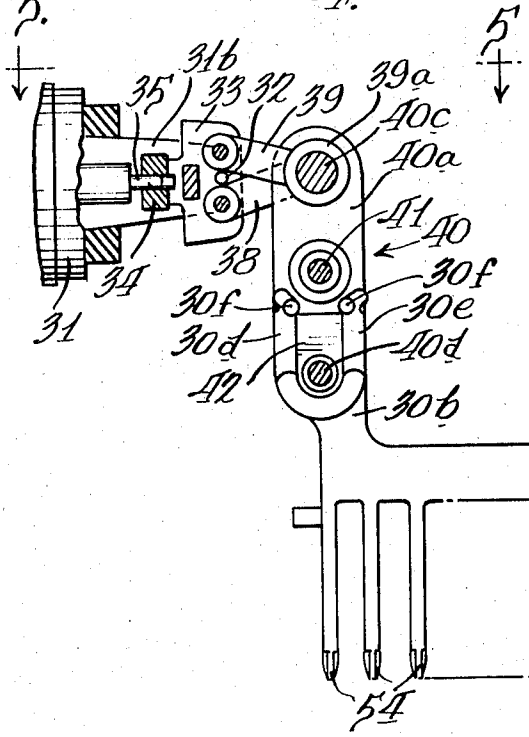


Fig. 5.

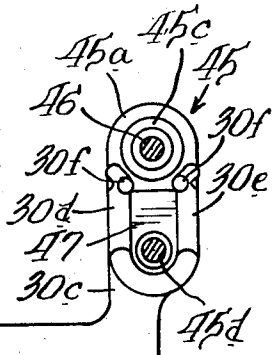


5.



5

Fig. 4.



COMBINED HAIR DRYER AND DETANGLER

BACKGROUND OF THE INVENTION

Among the more popular personal care products which have been marketed in substantial quantity in recent years is the hand-held hair dryer. Such hair dryers are small and compact having housings which can be readily held in the hand of the user and directed to various areas of the head and hair. Typically, such hair dryers include a small permanent magnet motor driving an elongated, tangential fan rotor which circulates air across a relatively high wattage heater. A safety thermostat is normally provided so that, if for any reason the air flow is blocked and temperatures increase excessively in the housing, the heater is disconnected. Because of the high wattage of the heater and the compact design of the housing, the risk of overheating in the case of diminished air flow is very substantial.

Another personal care appliance which has been marketed in substantial quantities in the last year is a hair detangling or untangling comb which includes a pair of counter reciprocating comb elements positioned close together and reciprocated at a relatively high speed in order to untangle the hair through which the teeth are moved. One embodiment of the untangling comb is disclosed and claimed in application Ser. No. 251,748 filed May 9, 1972 and assigned to the same assignee as this application.

Although the hand-held hair dryer and the detangling comb have both been marketed with much success in the past year, no attempts have been made to produce a combination appliance which would perform more efficiently the functions of a hair dryer and a hair detangling comb.

BRIEF SUMMARY OF THE INVENTION

The invention comprises a hand-held hair dryer which has combined with it a detangling comb arranged so that counter reciprocating combs are positioned immediately in front of the air discharge opening in the hair dryer and positioned coextensive with this air discharge slot. The hair dryer portion of the appliance includes a small permanent magnet motor which is drivingly connected to an elongated, tangential fan rotor which discharges air across an electric heating element and through a discharge slot in the housing. Positioned within the handle of the appliance is a second permanent magnet motor drivingly connected to the counter reciprocating combs which are detachably received on supporting and driving means arranged at either end of the air discharge passageway of the hair dryer.

It is an object of the present invention to provide a combined handheld hair drying and hair untangling appliance.

It is a further object of the present invention to provide a hand-held hair drying and hair untangling appliance having two separate and independent motors which drive the fan for the hair dryer and the reciprocating means for the hair untangling combs.

It is another object of the present invention to provide an improved hand-held hair dryer having hair untangling combs mounted coextensive with the air discharge opening in the housing and detachably connected to supporting and driving means positioned at either end of the air discharge opening for the hair dryer.

It is still another object of the present invention to provide a combined hand-held hair dryer and hair untangling comb having controls and drive means so that the hair dryer and detangling means may be operated completely independently of each other and whereby the overload on the detangling means will cause no slow down in the circulation of air by the hair dryer fan.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with more particularity in the claims annexed to and forming a part of this specification.

FIG. **1** is a perspective view of a combined hand-held hair dryer and hair detangling comb embodying the invention.

FIG. **2** is an enlarged sectional view taken lengthwise of the housing of the appliance.

FIG. **3** is an enlarged vertical sectional view taken substantially on line **3—3** of FIG. **2.**

FIG. **4** is a sectional view taken substantially on line **4—4** of FIG. **3** but having the hair dryer and housing portions removed for illustration purposes.

FIG. **5** is a top plan view of the drive mechanism taken substantially along line **5—5** of FIG. **4.**

Referring to the drawings, there is shown the combined hair dryer and hair detangling appliance designated generally by reference numeral **11.** The combination appliance **11** is provided with a housing **12** which, as illustrated in FIG. **3,** is formed by two housing halves **13** and **14** which abut along a central plane. The rear housing half **14** is formed with a series of slots **15** which are positioned along the length of an elongated tangential fan rotor **16** to permit the entry of air into the fan rotor **16.**

In order to drive the fan rotor **16,** there is provided a small permanent magnet motor **18** which is supported in a well-known manner clamped between walls formed on the housing halves **13** and **14.** The motor **18** includes an output shaft **19** which has a resilient rubber drive bushing **20** received on the outer end thereof. The rotor **16** has end walls **16***a*, one of which is provided with an opening in which the bushing **20** is received for driving engagement therewith, there being an annular groove **20***a* in bushing **20** in which the engaging portion of end wall **16***a* is received. The other end of the fan rotor **16** is supported by a stub shaft **16***b* which is received in a bearing **21** captured between opposed walls of the housing halves **13** and **14.**

The air drawn in through the air intake slots **15** passes through the fan rotor **16** and is discharged downwardly as shown in FIG. **3** into an air discharge duct **23.** The air discharge duct **23** is in the form of a generally rectangular box having a top, inlet opening **23***a* and a bottom outlet opening **23***b*. Received within the duct **23** is an insulating card which extends lengthwise in the duct and extends from the inlet **23***a* to the outlet **23***b* and has a resistance wire heating element **24** wound thereon as is best shown in FIG. **2.** Thus, air discharged from the fan rotor **16** through the duct **23** is heated as it passes across the heating element **24.** The motor **18** is a 12 volt d.c. motor which is connected in series with the heating element **24** and a rectifier across the line

voltage, the heating element 24 serving as a dropping resistance.

Adjacent the outlet 23*b* of the air discharge duct 23 the housing 12 is formed with an elongated opening 25 within which is positioned a grill member 26. The grill member 26 is retained in the opening 25 of the housing 12 by a peripheral rib 26*a* which is received in a groove 13*a* and 14*a* formed in the housing halves 13 and 14 respectively.

The grill member 26 is formed with an outer frame portion 26*b* and a plurality of transversely extending grill ribs 26*c*. The grill ribs 26 are positioned close enough to prevent a person's fingers from engaging the heating element 24 while at the same time providing little obstruction to the air being discharged from the duct 23. Mounted in an opening in the side wall of duct 23 is a thermostat 27 which is connected in circuit with the heating element 24. Thermostat 27 is calibrated to open the heater circuit when the heat within the duct 23 rises to a point where the plastic parts might be likely to distort or deform. This condition may occur if the fan 16 fails to operate while the heater 24 is functioning or when there is a blockage of air flow through the duct 23.

Extending lengthwise of the opening 25 and perpendicular to the grill ribs 26c are a pair of counter reciprocating combs 30 which are mounted in closely spaced relation to each other to be reciprocated through a relatively small stroke in order to untangle hair as is described in greater detail in copending application Ser. No. 251,748, filed May 9, 1972. The mechanism for reciprocating the combs includes a motor 31 which is similar to the motor 18 insofar as it is a small permanent magnet motor. Motor 31 is a 120 volt motor which is adapted to be connected through a rectifier to the power supply so that it may be operated completely independently of motor 18. The power requirements for the combs 30, however, are considerably greater than those of the rotor 16 and, accordingly, the motor 31 is substantially more powerful than the motor 18. The motor 31 is supported by walls formed on the opposed housing halves 13 and 14 and includes at one end a die cast member 31*a* having spaced projecting arms 31*b* as are best shown in FIG. 5. The projecting arms 31*b* receive at their outer ends an axle 32 on which a rocker member 33 is mounted for oscillatory movement. The rocker member 33 is formed with a transversely extending drive bar or yoke 34 which is pivotally supported in opposed walls of the rocker member 33. The drive bar 34 is formed with a lengthwise extending slot 34*a* within which is received an eccentric or crank pin 35. The crank pin 35 is offset with respect to the output shaft of the motor 31 and moves in a circular path causing the rocker member 33 to be oscillated about the axle 32.

Associated with the rocker member 33 above and below the axle 32 are connecting rods 38 and 39. The connecting rods 38 and 39 are pivotally connected to the rocker member 33 so that as the rocker member is oscillated by the motor 31, the rods 38 and 39 move lengthwise in an out of phase relationship.

To drivingly interconnect the rods 38 and 39 with the combs 30, there are provided identical comb supports or links 40 which pivot at their midpoints on an assembly bolt or axle 41 and are connected at their lowermost ends to the combs 30. As is evident from FIG. 3 the assembly bolt 41 is provided with a nut at one end and serves to retain the housing halves 13 and 14 together. Each of the links 40 includes two spaced plate members 40*a* and 40*b*. At the upper ends the links 40 have their plate members 40*a* and 40*b* connected to the connecting rods 38 and 39. The ends of the rods 38 and 39 are formed with enlarged bearing bosses 38*a* and 39*a* which are received on bearing portions 40*c* formed on the plate members 40*a*. Similarly, at the other ends of the links 40, the plate members 40*a* are formed with bearing portions 40*d* on which are received drive blocks 42. The drive blocks 42 and the bearing bosses 38*a* and 39*a* are retained on the bearing portions 40*c* and 40*d* by the plate members 40*b*. With the spaced plate members 40*a* and 40*b* and the bearing connections therebetween, the links 40 have some resemblance to a link in a bicycle chain. As the motor 31 drives the rocker member 33, the connecting rods 38 and 39 cause the links 40 to pivot about the axle 41 causing the drive blocks 42 to reciprocate thus driving the combs 30 in a counter reciprocating manner.

It should be noted that by each of the combs 30 is somewhat U-shaped in configuration having a back portion 30*a* and upwardly extending drive connecting portions 30*b* and 30*c*. The connecting portions 30*b* and 30*c* are both formed with spaced legs 30*d* and 30*e*. The spaced legs 30*d* and 30*e* serve the multiple function of detachably connecting the combs 30 to the driving and supporting links 40 and also provide bearing means that resist twisting of the comb when force is applied to the comb as it is passed through the hair. These bearing portions are proturbances 30*f* which extend into engagement with the inner sides of the plate like members 40*a* and 40*b* and slide in engagement therewith as the combs are reciprocated. The bearing portions 30f also serve to retain the combs 30 in assembled position. As may be seen best in FIG. 4, the bearing portions 30*f* are engaged above the upper face of the drive block 42. The resilience of the legs 30*d* and 30*e* permit the comb 30 to be detached by simply forcing the comb downwardly and thereby flexing the legs 30*d* and 30*e* so that the bearing portions 30*f* may pass downwardly along the sides of the bearing block 42 to complete the disengagement.

The ends of the combs 30 remote from the motor 31 are supported on a simple idler link 45 which includes spaced plate members 45*a* and 45*b* (see FIG. 2). Plate member 45*a* is formed with a boss 45*c* which is pivotally supported on an assembly bolt 46 which is similar in form and function to the bolt 41 described above. The other end of the plate member 45a is formed with a post 45*d* on which is pivotally supported a connecting block 47. The connecting block 47 is retained in position by the plate member 45*b* which is coextensive with the plate member 45*a*. The legs 30*d* and 30*e* formed on the support 30*c* cooperate with the connecting block 47 in the same manner as the corresponding parts at the other ends of the combs.

As may best be appreciated from considering FIGS. 2 and 3, the combs 30 are situated in such a position that they extend lengthwise of the discharge nozzel formed by the grill member 26. The heated air provided by the fan rotor 16 and the heating element 24 will be discharged directly on the portion of the hair being vibrated and oscillated by the counter reciprocating combs 30. This rapid and violent action of the combs on the hair separates the strands of hair and makes them very easy to dry at the same time they are

being untangled. Accordingly, the drying action produced by the hair dryer is expedited considerably by the presence of the counter reciprocating combs. In addition, the detangling action of the combs permits the hair to be separated, untangled and dried much faster than would be possible using a simple comb with a hair dryer.

The loads associated with the detangling combs **30** may be quite large depending on the nature and quality of the hair being untangled. Also the rate with which the user moves the comb through the tangled hair has a significant effect on the load placed on the combs **30.** In many instances, however, the rate of reciprocation of the combs **30** is decreased considerably as a consequence of this load. By having a separate motor **31** driving the detangling mechanism, the air circulated by the rotor **16** is in no way affected by the load placed on the motor **31.** This provides an important advantage since because of the compact design of the hair dryer and the relatively high wattage of element **24,** it is important that air be continuously circulated across the heating element to prevent undesirable high temperatures from developing within the housing **12.**

To provide means for readily manipulating the housing **12,** the appliance **11** is provided an elongated handle **50** which extends laterally from the main portion of the housing which encloses the bulk of the hair dryer and detangler mechanism, this main portion of the housing being termed the body portion **51.** Enclosed within the handle **50** is the motor **31** described above as well as a double switch **52** which includes a switch **52*a*** for controlling the hair dryer operation and a switch **52*b*** which controls separately the detangler. The switches **52*a*** and **52*b*** are connected in series circuit with a power cord **53** which enters the end the handle **50*a*** is best shown in FIG. **2.**

It should be noted that the handle **50** extends from the central portion of the body portion **51** to provide good balance and easy manipulation of the appliance. This arrangement also permits the motor **31** to be mounted within the handle **50** and coupled by the relatively short drive links **38** and **39** to the reciprocating combs **30.**

As is explained more completely in the copending application referred to above, it is contemplated that the combs **30** would include relatively large teeth **54** which have a center to center spacing of 0.25 inch in a preferred embodiment. In addition, the spacing between the adjacent combs was on the order of 0.065 inch in this preferred embodiment. For the most acceptable performance the combs are reciprocated at a rate of between 6,000 and 9,000 cycles per minute. The stroke length in a preferred form should be on the order of 0.030 to 0.130 inch. If the stroke length is such that when compared to the tooth spacing that the teeth tend to bypass each other excessively, there is a tendency for the comb to pull the hair and not work as satisfactorily as when shorter stroke lengths are utilized.

While there has been shown and described a particular embodiment of the present invention, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the invention in its broader aspects, and it is, therefore, contemplated in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A hair drying and detangling appliance comprising a housing enclosing a first motor and an elongated tangential fan drivingly interconnected and positioned along one wall of said housing with said first motor and fan having their axes aligned, air intake means in said housing adjacent to said fan, air discharge means in said housing comprising an elongated slot substantially coextensive with said fan and interconnected with said fan by a duct within which a heater for heating the air is positioned, support means on opposite sides of said duct for mounting a pair of spaced parallel comb members, a second motor drivingly interconnected to said combs to reciprocate said combs in opposite directions, said combs being positioned to extend lengthwise in front of said slot outside of said housing with support portions extending into said housing adjacent said duct.

2. The combination of claim **1** wherein each comb includes a back portion extending parallel to said slot and teeth extending outwardly from said back portion in the direction of air flow from said slot, comb supports at both ends of said back portion extending in an opposite direction from said teeth, said supports having bifurcated ends which detachably engage with said support means, said comb supports extend into said housing between the ends of said slot and said duct.

3. The combination of claim **2** wherein each end of each said comb is supported on a lever pivoted to said housing, transmission means interconnecting said second motor and one of said levers to oscillate said levers.

4. The combination of claim **3** wherein said second motor drives a crank pin which is eccentric to the axis of said motor, said transmission means including a drive block mounted for pivotal movement about an axis perpendicular to the axis of said second motor and driven in oscillating movement by said crank pin, connecting rods each pivotally connected to said drive block at one end and to one of said levers at the other end whereby the oscillating movement of said drive block is transmitted to said levers.

5. The combination of claim **1** wherein said housing comprises a body portion which encloses said first motor said fan and said heater and duct, said housing having a handle portion extending centrally from one end of said body portion parallel to the common axis of said first motor and fan, said second motor being enclosed in said handle portion.

6. The combination of claim **2** wherein said support means comprise a pair of links, each link supporting each end of both combs, having spaced plate portions which straddle a connecting block, each said blocks being pivotally connected to said plate portions at one end of said link, said bifurcated ends of said comb supports resiliently engaging said blocks to detachably retain said combs in driven engagement with said support means.

7. The combination of claim **6** wherein said bifurcated ends of said comb supports are formed with bearing portions which engage the opposed faces of said plate portions to resist twisting of said combs.

8. A combination hair drying and hair detangling appliance comprising a housing enclosing a motor driven fan and a heater, an air duct directing air from said fan across said heater to heat said air, an elongated slot

formed in said housing at one end of said duct through which said heated air is discharged, a pair of spaced parallel combs extending lengthwise of said slot in the stream of air discharged from said slot, said combs having support portions extending into said housing at the ends of said slot, lever means within said housing but outside of said duct supporting each end of each comb, a second motor for reciprocating said combs, said lever means including a pair of connecting rods interconnecting said motor and said combs to reciprocate said combs in an out of phase relationship.

9. The combination of claim **8** wherein said housing includes a handle within which said second motor is enclosed, a power cord extending from said handle, said handle supporting a pair of switches one of which is connected to said power cord in series with said motor driven fan and heater and the other being connected to said power cord in series with said second motor.

10. The combination of claim **8** wherein said housing is formed by two cup housing halves, said lever means being supported for pivotal movement on bolts which extend through said housing halves and retain them in assembled relation.

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