March 15, 1960 J. OSTER 2,928,171

CUTTING HEAD ASSEMBLY FOR ELECTRIC HAIR CLIPPERS

Filed Dec. 24, 1958 2 Sheets-Sheet 1

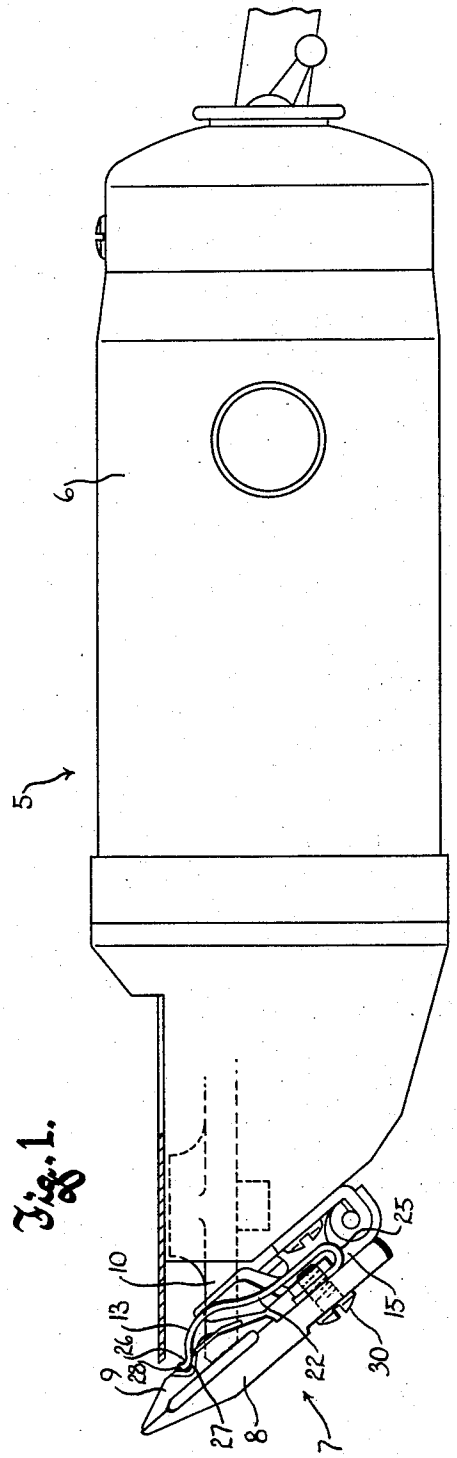

Fig. 1.

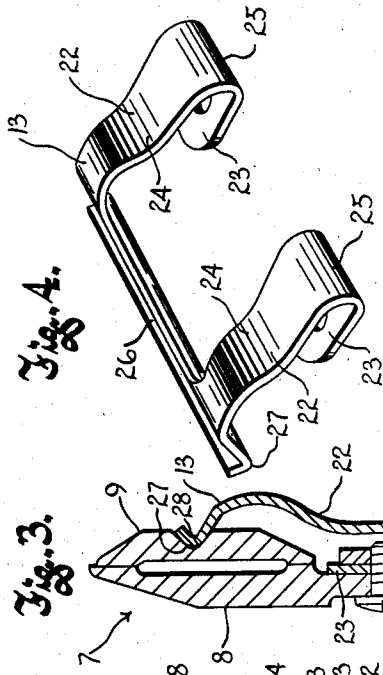

Fig. 4.

Fig. 3.

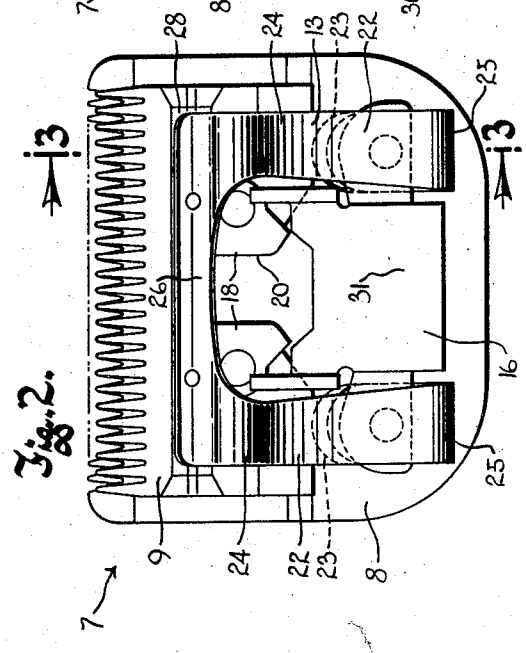

Fig. 2.

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Fig. 6.

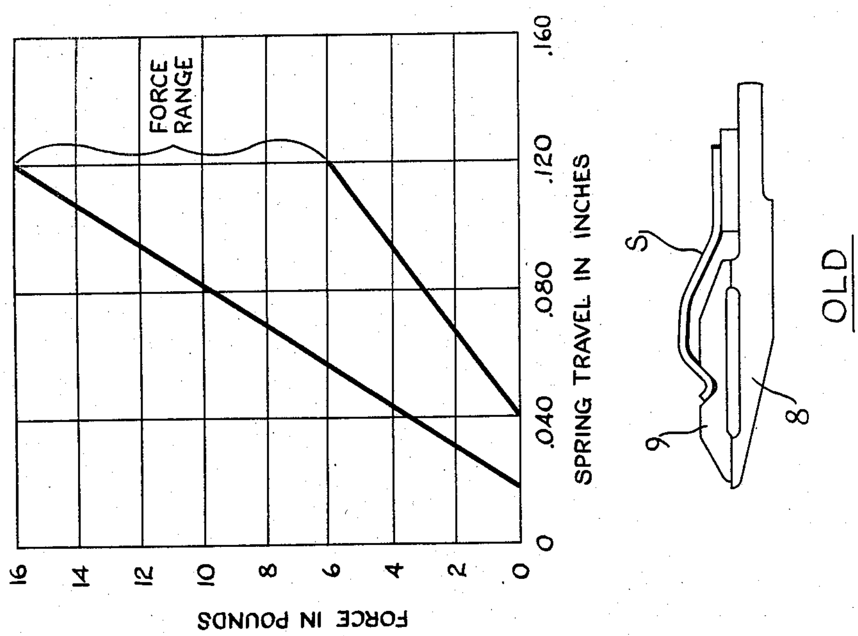
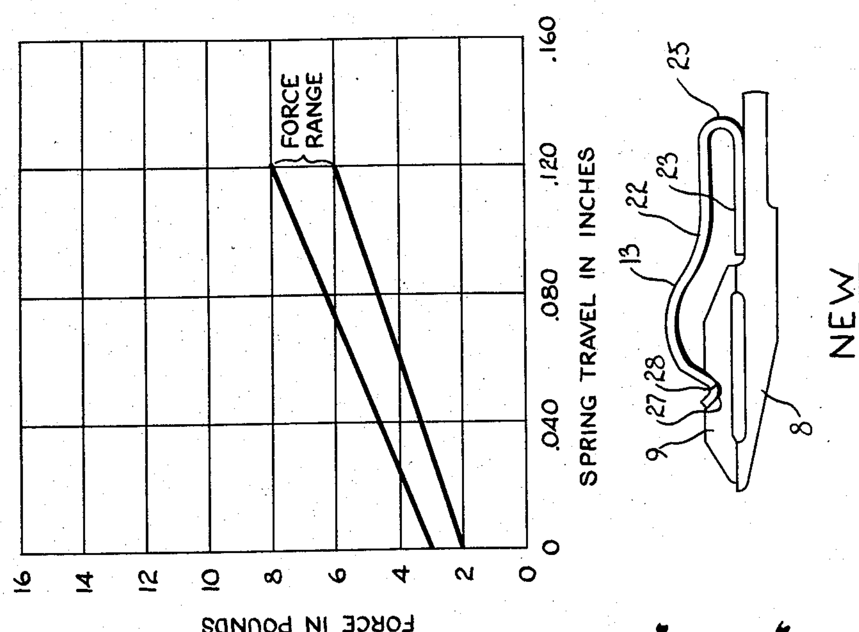


Fig. 5.



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United States Patent Office 2,928,171 Patented Mar. 15, 1960

2,928,171

CUTTING HEAD ASSEMBLY FOR ELECTRIC HAIR CLIPPERS

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Application December 24, 1958, Serial No. 782,893

5 Claims. (Cl. 30—221)

This invention relates to electric hair clippers, and refers more particularly to improvements in cutting head assemblies for such electric clippers.

As is well known, an electrlic hair clipper comprises a body that provides both a housing for its electric motor and a handle for the device, and a cutting head which is usually readily detachably mounted on the front end of the body and which includes cooperating stationary and movable blades having toothed cutting edges. The movable blade of the cutting head flatwise overlies the stationary blade and is reciprocated from side to side relative to the stationary blade by means of a driving lever actuated by the electric motor in the body of the clipper. To insure that the teeth of the blades will have a good shearing action, the movable blade is pressed flatwise against the stationary blade by means of a spring member secured to the stationary blade and forming a part of the detachable cutting head.

Heretofore it has been well recognized that the amount of force exerted by the spring member in urging the movable blade flatwise against the stationary blade is a critical factor in the operation of a clipper. If the movable blade is pressed against the stationary blade with insufficient force, the clipper does not cut well since the blades tend to be separated by hairs engaged between their teeth. However, if the spring member exerts excessive pressure upon the movable blade, the latter will drag so heavily against the stationary blade that the motor runs slower which, of course, results in a sluggish cutting action.

From experience it is known that for best results, the blades of the cutting heads with which this invention is concerned, should be held together with a minimum of six pounds of force, and not greatly in excess of that. Ideally, the tension spring used to hold the blades together would provide and maintain this optimum spring tension, but for many reasons this ideal condition could not possibly be uniformly attained in production, and in those few instances when it was achieved, it would not be maintained during use of the clipper.

As the contacting blade surfaces wore down with use, the spring force would decrease; or it might increase if burrs developed on the blades from their operation. Variations in thickness of the film of lubricating oil would also affect spring tension. In addition to these variables, there were also the usual variations in the dimensions of the parts at the time of manufacture. These many unpredictable factors forced the manufacturer to accept a sixteen pound top limit for the spring tension; and with that wide a tolerance—from a minimum of six pounds to a maximum of sixteen—most of the blade asemblies left the factory with a spring tension of ten to twelve pounds.

As a result of this unnecessarily heavy spring tension, there was undue wear on all of the moving parts of the machine, the motor ran too slow so that the cutting action was sluggish, and because of the increased load the motor would heat up excessively, often to the point

where it caused discomfort to the barber and the customer. Incorrect tension on the cutting blades was thus by far the greatest source of trouble and irritation to the clipper manufacturer.

The purpose and object of this invention is to eliminate the cause of all of this trouble by providing a new and improved blade tensioning spring for the cutting head assembly of an electric hair clipper, whereby the force with which the blades are held together can be easily held between relatively close tolerances during manufacture and remains so during the life of the cutting head, despite substantial changes in the condition of the contacting surfaces of the blades.

More specifically, it is an object of this invention to provide a cutting head for an electric hair clipper of the character described, wherein the spring which presses the movable blade flatwise against the stationary blade has a compound spring action combining the resilience of a torsion spring with that of a cantelever mounted flat leaf spring, with the result that the spring has a larger effective length than the springs it replaces, and because of its additional length and compound action can be held to closer force tolerances during manufacture and maintains the desired clamping pressure upon the blades substantially constant despite varying conditions of wear or lubrication of the contacting blade surfaces.

It is also an object of this invention to provide a clipper blade tension spring for electric hair clippers which occupies substantially the same space that spring members heretofore available required, which is easily mounted on the cutting head of the clipper, and which cooperates with a strap and with the stationary blade to define a mounting tongue receiving socket; and which, along with these advantages, provides superior performance in biasing the blades of the cutting head toward one another with an accurately predetermined and closely maintained force.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side elevational view of an electric hair clipper having a cutting head embodying the principles of this invention;

Figure 2 is a top plan view of the cutting head of the electric clipper shown in Figure 1;

Figure 3 is a vertical sectional view taken on the plane of the line 3—3 in Figure 2;

Figure 4 is a perspective view of a cutting head spring member embodying the principles of this invention;

Figure 5 is a graph showing how little the force exerted by the spring member of this invention, illustrated at the bottom of this view, varies with change in the extent of its flexure; and

Figure 6 is a graph similar to Figure 5 but showing how much more the force of the spring member in the conventional prior cutting heads, illustrated at the bottom of the figure, varied with change in the extent of flexure.

Referring now more particularly to the accompanying drawings, the numeral 5 designates generally an electric hair clipper comprising a body 6 which provides both a handle for the clipper and a housing for its motor, not shown, and a cutting head 7 readily removably mounted

on the front end of the body. The cutting head comprises a stationary bottom blade 8 and a movable top blade 9 reciprocable from side to side across the top face of the stationary blade. A medially pivoted lever 10 drivingly connected with the motor and the movable blade imparts the side to side cutting motion to the movable blade. Both blades have toothed front edges which coact to effect cutting by shearing the hairs caught between the teeth of the two blades as the movable blade reciprocates to carry its teeth across those of the stationary blade.

For the blades to cut properly, it is of course necessary that they be urged flatwise against one another with their toothed edge portions in good shearing relationship. To this end the cutting head includes a spring member 13 which is secured to the stationary blade and presses down upon the movable blade. It is this spring member and its mounting with which the invention is chiefly concerned, but before taking up the detailed description thereof it would be well to describe the manner in which the cutting head is readily removably connected to the front end of the clipper body, though this connection has become widely known in the hair clipper art. Briefly, it consists of a tongue 15 hingedly mounted on the body for swinging motion toward and from a detent defined raised or closed position, in which the tongue overlies the inclined front end of the body. A strap 16 on the cutting head cooperates with the upper surface of its stationary blade to define a slot-like socket in which the tongue is engageable, such engagement being possible when the tongue is swung to its lowered or open position. With the tongue in its raised or closed position, the cutting head is, of course, held in its operative position illustrated in Figure 1. In this position the front end of the lever 10 is engaged between a pair of hardened wear shoes 18 on the movable blade, one at each side of a rearwardly opening notch 20 therein, so that the lever can impart reciprocating side-to-side motion to the movable blade as the lever is oscillated by the motor.

Patents Nos. 1,888,688 and 2,182,597, contain more specific disclosures of a structure similar to that which has been described in general terms up to this point.

Heretofore, the spring employed to hold the blades together has been of the simple leaf spring type mounted cantilever fashion, though in plan it was substantially U-shaped with short, slightly curved legs providing the spring blades or leaves. The ends of these short blades or leaves were connected by the bight portion of the U which overlay and press against the movable blade. In cross section the bight portion was shaped to provide a downwardly facing ridge which engaged in a generally V-shaped groove in the top face of the movable blade to constrain the same to straight line side-to-side motion, it being understood that the ends of the legs of this spring member were fixed to the stationary blade. This is the structure shown in the aforesaid Patent No. 1,888,688, and illustrated in Figure 6 where it is designated by the reference character S.

Figure 6 also illustrates the deficiency of this prior type of spring member. Because of the shortness of the spring blades provided by its legs, a very slight deflection of the legs produced a very substantial change in the force which the spring member exerted against the movable blade. Moreover, a group of such spring members, made as nearly identical as possible by normal production methods, would vary widely in stiffness from unit to unit, due to slight variations in metal thickness, temper, and other factors. The limiting values of response for the stiffest and least stiff units in a normal group of such springs are depicted by the lines designated "Force Range" in Figure 6.

On the other hand, the spring member 13 of this invention, as indicated by the graph in Figure 5, not only produces less force variation for a given amount of deflection but can be manufactured to more accurate tolerance limits, as indicated by the "Force Range" lines in Figure 5 designating the response characteristics for the stiffest and most resilient units in a typical group of such spring members.

The reason for the more precise response of the spring member of this invention resides in its shape and formation. As best shown in Figure 4, the spring member 13 comprises a pair of identical leaf springs 22 each doubled upon itself into a looped or substantially U-shaped formation having a short inner leg 23 which is fastened to the stationary blade, a longer outer leg 24 and an arcuate bend or medial portion 25 connecting the inner and outer legs. These two leaf springs are connected at the free ends of their outer legs 24, by a cross bar 26, and preferably the two leaf springs and their connecting cross bar are one integral stamping of hard Phosphor bronze or similar metal.

The spring member of this invention, like its predecessor is thus generally U-shaped in plan, and the cross bar 26 which forms the bight of the U is so shaped in cross section that it provides a downwardly facing straight ridge 27. This ridge engages in a V-shaped groove 28 in the top face of the movable blade to guide and constrain the same to straight line reciprocating motion parallel to its cutting edge.

The securement of the spring member to the stationary blade is exceptionally rigid by virtue of the fact that the short inner legs of its two leaf springs are clamped between the stationary blade and the end portions of the socket forming strap 16. Screws 30 which pass through the stationary blade from the underside thereof, and through the inner legs of the leaf springs are threaded into tapped holes in the strap to secure these parts together. The medial portion 31 of the strap is held spaced from the outer face of the stationary blade by the interposed inner legs of the leaf springs so that the inner legs cooperate with the strap and the stationary blade in defining the tongue receiving socket, but preferably the medial portion of the strap is outwardly offset, as shown, to increase the size of the socket.

Attention is directed to the fact that by virtue of the shape of the leaf springs 22 they have a compound spring action. They function not only as ordinary cantilever mounted leaf springs, but also have the action characteristic of a torsion spring, since the bends 25 which connect their legs are in fact semi-torsion springs. It should also be noted that the anchored ends of the long outer legs 24 are spaced a substantial distance above the top face of the stationary blades to which the short inner legs are clamped. As a result, the points from which the outer legs act to press down upon the movable blade are higher than they were before so that more of the spring force applied to the movable blade is exactly downward, and practically none of it acts horizontally, i.e. in the plane of the blades.

It should probably also be pointed out that at the time the spring member 13 is secured to the stationary blade, the movable blade is not in position, and that at this time the cross bar 26 does not even contact the top face of the stationary blade. Accordingly, the entire spring unit is in its relaxed unbiased condition, but the space between the underside of the ridge 27 on the cross bar and the top face of the stationary blade is less than it is when the movable blade is slid into position. It is thus the insertion of the movable blade between the spring and the stationary blade which tensions the spring.

From the foregoing description taken together with the accompanying drawings, it will be apparent that this invention provides a solution to a problem that has long perplexed the makers of electric hair clippers, namely, how to reliably achieve and assure the maintenance of optimum tension in the springs used to hold the cutter blades together; and that it solves this problem without entailing any change in the cutter blades or the general organization of the cutter blade assembly. It should also

be apparent that this accomplishment is brought about by the simple expedient of giving the leaf springs 22 the described U-shaped formation which increases their effective length without requiring additional space and raises the points from which the spring force is applied; and that by virtue of the increased effective length of the leaf springs, it has been possible to reliably achieve a predetermined spring tension or force during manufacture and to maintain substantially that same tension or force during use.

What is claimed as my invention is:

1. In a motor driven hair clipper of the type having cooperating stationary and movable blades with toothed front edges, and wherein the movable blade flatwise overlies the stationary blade and is laterally reciprocable relative thereto, spring means urging the two blades flatwise toward one another and also readily removably locating the movable blade upon the stationary blade, said spring means comprising: a pair of substantially identical leaf springs each doubled upon itself into a U-shaped formation with a short inner leg and a longer outer leg overlying but spaced from the inner leg and connected thereto by an arcuate bend so that the outer leg may be flexed toward as well as from the inner leg; means clamping the short inner legs of both leaf springs directly to the stationary blade with the ends of said inner legs adjacent to the rear edge of the movable blade and at a level below the top of the movable blade, and the long outer legs disposed over the top of the movable blade; a cross bar connecting the ends of the long outer legs and bearing down upon the movable blade to press the same against the stationary blade; and slidingly interengaging guide means on the cross bar and the movable blade constraining the movable blade to lateral reciprocation, engagement and disengagement of said guide means requiring only relative lateral motion of the blades so that the blades may be quickly and easily disassembled and reassembled.

2. A cutting head for electric hair clippers comprising: cooperating stationary and movable blades in flatwise overlying engagement; spring means clamping said blades flatwise together and holding them in predetermined cooperative relationship, said spring means being an integral stamping formed to have a pair of leaf springs each doubled upon itself to provide a short inner leg and a longer outer leg overlying but spaced from the inner leg and connected thereto by a curved bend, and a cross bar connecting the extremities of the longer outer legs of the two leaf springs; means securing the short inner legs of both leaf springs directly to the top of the stationary blade with the ends of the inner legs directly behind the movable blade and at a level below the top of the movable blade, the cross bar pressing down upon the top of the movable blade; and slidingly interengaging guide means on the cross bar and the movable blade constraining the movable blade to lateral reciprocation.

3. In a motor driven hair clipper of the type having cooperating stationary and movable blades with toothed front cutting edges, and wherein the movable blade flatwise overlies the stationary blade and is reciprocable laterally relative to the stationary blade, means defining the position of the cutting edge of the movable blade with respect to that of the stationary blade and urging the movable blade flatwise toward the stationary blade to press the cutting edge portions of the blades flatwise together, said means comprising: a pair of spring leaves each doubled over upon itself to have a short inner leg and a longer outer leg connected by a curved medial portion; means securing the inner leg of each spring leaf to the stationary blade, in flatwise engagement therewith directly behind the movable blade, with the curved medial portion of each spring leaf remote from the front cutting edges of the blades and spacing the outer and inner legs from one another; a cross bar connecting the free ends of the longer outer legs of the two spring leaves, overlying and pressing down upon the movable blade; and slidingly interengaging guide means on the cross bar and the movable blade constraining the movable blade to lateral reciprocation with its cutting edge in a predetermined position with respect to that of the stationary blade.

4. The motor driven hair clipper of claim 3 further characterized by a strap having end portions overlying the inner legs of said spring leaves and held spaced from the adjacent face of the stationary blade by them, said strap cooperating with the inner legs of the spring leaves and with the adjacent face of the stationary blade to define a socket in which a tongue is engageable for mounting the blade assembly on a clipper.

5. In a motor driven hair clipper of the type having cooperating stationary and movable blades with toothed front edges, and wherein the movable blade flatwise overlies the stationary blade and is laterally reciprocable relative thereto, means defining the relative positions of the toothed front edges of the blades and urging the two blades flatwise toward one another, said means comprising: a pair of substantially U-shaped spring leaves, each having a short inner leg and a longer outer leg; means securing the short inner leg of each spring leaf flatwise to the top of the stationary blade, behind the movable blade, and with the bight portion of the spring leaf rearmost, so that its longer outer leg projects toward the front cutting edges of the blades; a cross bar connecting the outer ends of said longer legs of the two spring leaves and bearing upon the movable blade with a force dependent upon the extent the spring leaves are flexed by the insertion of the movable blade between the cross bar and the stationary blade, the U-shaped form of the spring leaves providing them with substantial length so that slight variations in the distance between the underside of the cross bar and the top face of the stationary blade do not seriously affect the force with which the spring leaves hold the blades together, whereby said force is more easily predetermined during manufacture and remains substantially unchanged during use; and slidingly interengaging guide means on the cross bar and the movable blade constraining the movable blade to lateral reciprocation with its cutting edge in a predetermined position with respect to that of the stationary blade.

References Cited in the file of this patent

UNITED STATES PATENTS

1,956,042	Oster	Apr. 24, 1934
2,182,597	Oster	Dec. 5, 1939
2,484,610	Chomonic	Oct. 11, 1949

FOREIGN PATENTS

828,208	Germany	Jan. 17, 1952
324,006	Switzerland	Oct. 15, 1957