Joseph Alter
1412 Oldbury Pl
Westlake Village, CA, 91361
joealterinc@gmail.com
voice 310-751-4927
In Pro Per

ORIGINAL

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CENTRAL DISTRICT OF CALIFORNIA
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**UNITED STATES DISTRICT COURT**
**for the**
**CENTRAL DISTRICT OF CALIFORNIA**

| | |
|---|---|
| Joseph Alter<br><br>**Plaintiff**<br><br>v.<br><br>The Walt Disney Company<br><br>**Defendant** | CV11-08277-PA (CWx)<br>Civil Action No.<br>**COMPLAINT FOR PATENT INFRINGEMENT and DEMAND FOR JURY TRIAL** |

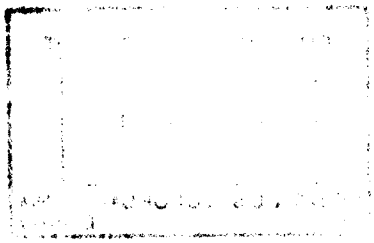
RECEIVED
CLERK, U.S. DISTRICT COURT
OCT - 3 2011
CENTRAL DISTRICT OF CALIFORNIA
BY DEPUTY

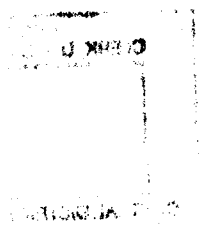
**COMPLAINT FOR PATENT INFRINGEMENT**
**and Demand for Jury Trial**

**PLAINTIFF'S ORIGINAL COMPLAINT**

1. Plaintiff Joseph Alter ("Plaintiff"), by and through the undersigned Pro Se litigant, files this Original Complaint against The Walt Disney Company ("Defendant").





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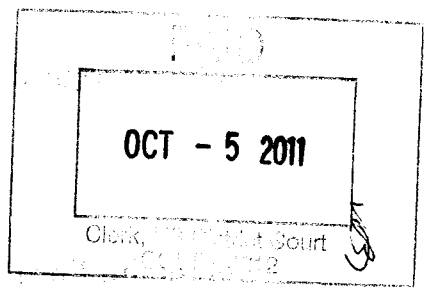


## NATURE OF THE ACTION

2. This is a patent infringement action to stop Defendant's infringement of Plaintiff's United States Patent No. 6,720,962 entitled "Hair generation and other natural phenomena with surface derived control volumes in computer graphics and animation." (the "'962 patent"; a copy of which is fixed hereto as Exhibit A). Plaintiff is the exclusive assignee of the '962 patent. Plaintiff seeks injunctive relief and monetary damages.

## PARTIES

3. Plaintiff is an individual and a citizen of the state of California. Plaintiff maintains its principal place of residence at 1412 Oldbury Place, Westlake Village, CA, 91361. Plaintiff is the sole assignee of the patent-in-suit with respect to the Defendant, and possesses the right to sue for infringement and recover past damages.

4. Upon information and belief, The Walt Disney Company is a corporation organized and existing under the laws of the State of California with its principal place of business located at 500 S. Buena Vista Street, Burbank, CA 91521.

## BACKGROUND

5. In layman's terms, what is principally at issue here are details central to systems for creating hair and fur on animated characters in film, commercials, games and simulations. It is also used for creating things like grass, feathers, trees, and other systems that manage enormous amounts of natural detail in ways that practical and do not inhibit artistic creativity. To the lay person, this might seem like a trivial issue, and the patent claims themselves even more so - however if you put Toy Story beside virtually any animated or visual effects film made in the last 10 years, it is quite apparent that this kind of high detail is principally what's different 17 years later. It was for many years a highly sought after goal in the industry. Toy Story was not a movie about plastic toys by coincidence.

6. Joseph Alter is a well known and respected pioneer in the field of computer graphics animation. His work on particularly intractable problems in the field have won him awards and worldwide recognition. The '962 patent is cited by 21 other patents from industry giants like Microsoft, Sony, Pixar, and Dreamworks. Its methodology is central to a product that the plaintiff has created and distributed for 11 years known as "Shave and a Haircut". It is used routinely in thousands of studios worldwide.

7. The '962 patent is important because it was the first research to identify what is now

recognized as a central defining issue in what are considered modern hair systems and has added key insight to the field. Prior to breakthrough discussed in the '962 patent, 20 years of research directed at this kind of "multiplication of detail" for hair, fur, and similar phenomena, at some of the largest universities and corporations in the world prior to the Plaintiffs effort failed to make the observations this patent focuses on exclusively, favoring instead well worn incremental engineering related to speed, rendering and applied physics, while overlooking the very fundamental issue of creating methods to create a coordinate system framework to reliably carry out computations of lifelike detail that can naturally flex and move in natural ways in conjunction with physical simulations, particularly long dynamic hair. There are a handful of patents issued prior to this patent that all fail to deal with the issue and who's claims are mostly well covered ground in prior art, some of which is the Plaintiff's own, which dates back to 1992.

9. Prior to the embodiment cited in the patent, you will find research that has interpolated guides [Plaintiff - Oct 1995 Computer Graphics World], you will find research that applies rendering [kijiya '91], physical simulation [Rosenblum '92] lifelike displacements to them [kijiya '91] that remain oriented to the skin in motion. What you will not find, is a solution that can maintain all that lifelike detail's shape inside the interpolated elements as the hair blows around. The key insight was that

creating a coordinate system that extended out from the skin was not sufficient, that every hair that fills that volume needs to have its own coordinate system via a series of mathematical transformation matrices placed up the hair's length. As we will show at trial, the matrices need to be updated to flex with the hair as it moves around in a way that doesn't just mush all of the hair around like it's a stretchy block of rubber. Importantly, the matrices need to be created in a repeatable way since the actual interpolated hairs are usually thrown away right after they're drawn to make room for more. It is also discussed that these transforms can move virtually any kind of geometry around in place of hairs. This method is particularly easy to spot when you view a flowchart of the hair pipeline, but is also pretty easy to spot visually in motion.

8. Every related patent after the '962 patent discuss this coordinate system framework as a central feature that they build claims on top of.

9. The US patent office was not created to protect expedience - it was created to protect innovation *from* the gears of commerce allowing innovators to be rewarded for their discoveries. Protecting this patent serves the greater public good in that the conflict arises from a major multinational corporation that the Plaintiff feels is about to "*squash him under its heels and then beat him over the head with his own invention*".

This situation, he would respectfully submit is exactly what the patent system was created for.

10. As admirable and beloved as The Disney Corporation is, you cannot escape the fact that they are a production engineering machine. With this kind of apparatus at their disposal it is tempting if not easy, to reverse engineer efforts that are available as commercial products (such as the plaintiffs), copy their embodiment on as many machines as they would like (10s of thousands in house machines, more than Nasa) without restriction, make small tweaks to it, and shape it to their expedience and perhaps create some incremental improvements on the way.

11. The plaintiff at all times in his 11 years conducting business as a software publisher, has acted in good faith and has made high quality software that utilizes the '962 patent available for free to dozens of universities and research labs. It has been available to consumers and the production community at large at a quite reasonable price. It has been available to software publishers on license for inclusion into their own products. The plaintiff has not "sat on" a patent waiting to "pounce" on unsuspecting infringers without even putting the patent into practice, as is common with many frivolous patent suits. [Exhibit B,G]

12. What has brought the Defendant's infringement(s) to the Plaintiff's attention was their announcement that they plan to license their production software in direct competition with the Plaintiff for worldwide distribution.

13. The Plaintiff has acted in good faith with respect to the Defendant has, quite unusually, given specific arguments and has provided the Defendant every opportunity to dispute the claim of infringement [Exhibits C,D,E,F,G] with a substantive argument against, however the defendant has not been cooperative with regards specifics and has declined to participate in basic fact finding surrounding the alleged infringement. It is therefore necessary to utilize the courts to compel reasonable discovery and restrict the trade and practice of the '962 patent's claims until such time that a court can make its determination with the requisite information at its disposal.

14. Over the remaining lifetime of the Plaintiff's patent, distribution of said infringing software the Defendant has licensed out, it is believed, will create a multi million dollar hole in the Plaintiff's income and will dilute his brand creating irreparable harm whilst enriching the Defendant.

## JURISTICTION AND VENUE

14. This action arises under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq.*, including 35 U.S.C. §§ 271, 281, 283, 284, and 285. This court has subject matter over this case for patent infringement under 28 U.S.C. §§ 1331 and 1338(a).

15. The Court has personal jurisdiction over the defendant because: the Defendant is present within or has minimum contacts with the State of California and the Central District of California; the Defendant has purposefully availed itself of the privileges of conducting business in the State of California and in the Central District of California; the Defendant has sought protection and benefit from the laws of the State of California; the Defendant regularly conducts business within the State of California and within the Central District of California; and Plaintiff's causes of action arise directly from the Defendants' business contacts and other activities in the State of California and in the Central District of California.

16. More specifically, the Defendant, directly and/or through authorized intermediaries, or subsidiaries ships, distributes, offers for sale, sells, uses and/or advertises (including the provision of an interactive web page) its products and services in the United States, the State of California, and the Central District of California. Upon information and belief, the Defendant has committed patent infringement in the State of California and in the Central District of California, has

contributed to patent infringement in the State of California and in the Central District of California, and/or has induced others to commit patent infringement in the State of California and in the Central District of California. The Defendant has illegally solicited and engaged in license deals related to said infringement with customers in the State of California and in the Central District of California. The Defendants' employees who have engaged in infringement on their behalf are residents of the State of California, and the alleged infringing activities have taken place primarily in the State of California and the Central District.

17. Plaintiff notified Defendant of the '962 patent and Plaintiff's potential infringement claims in its August 12, 2011 letter [Exhibit E]. Further, patent notices are clearly visible on Plaintiff's web site, Plaintiff's software, and Plaintiff's documentation under 35 U.S.C. §287 and establish Defendant's constructive notice of the '962 patent at all times relevant to this Complaint. [Exhibit B and G]

18. Venue is proper in the Central District of California pursuant to 28 U.S.C. §§ 1391 and 1400(b).

## COUNT I - PATENT INFRINGEMENT

19. The '962 patent was duly and legally issued by the United States Patent and Trademark Office on April 13, 2004, after full and fair examination. Plaintiff is the owner of the entire right, title, and interest in and to the '962 patent, including the right to sue for infringement and recover past damages. A true and correct copy of the '962 patent is attached as Exhibit A to this Complaint.

20. Plaintiff is informed and believes that Defendant owns, operates, advertises, controls, sells, uses and otherwise provides several Hair, Fur, and Arbitrary Geometry generation systems wherein dynamic guides as those in the '962 patent are created, interpolated, and a plurality of matrices are formed along the length of the interpolated guides which are used to procedurally manipulate an instance of hair, fur, and , other geometric instances for the purposes of creation and rendering in ways that are stable with respect to a coordinate space that can move and flex while maintaining important visual details of the hair structure without aberrant motion artifacts directly as a result of the application of said plurality of matrices. Upon information and belief, Defendant has infringed and continues to infringe one or more claims in the '962 patent by making use of said systems as a key part of their production pipeline on a number of films, as has as well a recently advertised licensing deal involving one of said systems

(X-Gen) to Autodesk, Inc for commercial sale and distribution as part of their Maya product worldwide in direct competition with Plaintiff.

21. Plaintiff is entitled to recover from the Defendant the damages sustained by Plaintiff as a result of the Defendants' wrongful acts as in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

22. Defendants' infringement of Plaintiff's exclusive rights under the '962 patent will continue to damage Plaintiff, causing irreparable harm for which there is no adequate remedy at law, unless enjoined by this Court.

## JURY DEMAND

23. Plaintiff hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

## PRAYER FOR RELIEF

Plaintiff respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Plaintiff the following relief:

A. An adjudication that one or more claims of the '962 patent have been infringed, either literally and/or under the doctrine of equivalents, by the Defendant and/or by others to whose infringement Defendant has contributed and/or by others whose infringement has been induced by Defendant;

B. An award to Plaintiff of damages adequate to compensate Plaintiff for the Defendants' acts of infringement together with pre-judgment and post-judgment interest;

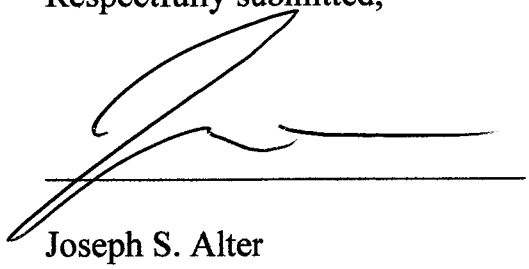
C. That, should the Defendant's acts of infringement be found to be willful from the time that Defendant became aware of the infringing nature of their actions, which is the time of filing of Plaintiff's Original Complaint at the latest, that the Court award treble damages for the period of such willful infringement pursuant to 35 U.S.C. § 284;

D. A grant of permanent injunction pursuant to 35 U.S.C. § 283, enjoining the Defendant from further acts of (1) infringement, (2) contributory infringement, (3) actively inducing infringement with respect to the claims of the '962 patent.

E. That this Court declare this to be an exceptional case and award Plaintiff its reasonable attorneys' fees and costs in accordance with 35 U.S.C. §285; and

F. Any further relief that this court deems just and proper.

Respectfully submitted,



Joseph S. Alter
In Pro Per

Dated : September 30, 2011

EXHIBIT "A" COPY

US006720962B1

(12) **United States Patent**
**Alter**

(10) **Patent No.: US 6,720,962 B1**
(45) **Date of Patent: Apr. 13, 2004**

(54) **HAIR GENERATION AND OTHER NATURAL PHENOMENA WITH SURFACE DERIVED CONTROL VOLUMES IN COMPUTER GRAPHICS AND ANIMATION**

(75) Inventor: **Joseph Scott Alter**, Los Angeles, CA (US)

(73) Assignee: **Joseph Alter Inc.**, Los Angeles, CA (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 193 days.

(21) Appl. No.: **09/730,325**

(22) Filed: **Dec. 4, 2000**

(51) **Int. Cl.**[7] ..... **G06T 17/00**
(52) **U.S. Cl.** ..... **345/420**; 345/423
(58) **Field of Search** ..... 345/420, 424, 345/419, 418, 428, 581

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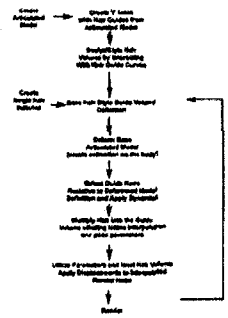
(List continued on next page.)

*Primary Examiner*—Mark Zimmerman
*Assistant Examiner*—Huedung X. Cao

(57) **ABSTRACT**

Methods for defining smooth and continuous coordinate systems in a volume comprised of a lattice structure of guide columns derived from arbitrarily modeled surface topologies involving polygons, nurbs, linear segments, and subdivision surfaces. Applications of these techniques in computer graphics and computer animation include: (1) the definition of pseudo-coordinate systems for use in creating geometry which must grow from said surface (2) the creation of a highly stable coordinate system involving guide columns in which Cartesian physical simulations may be carried out and rendered as well as deformed and rerendered if desired.

**10 Claims, 7 Drawing Sheets**



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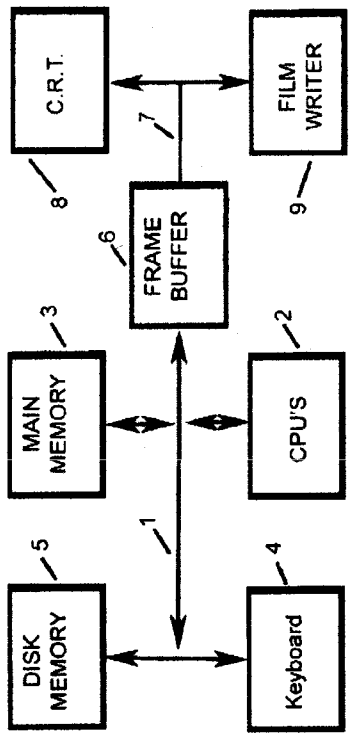
C.R.T.
FILM WRITER
FRAME BUFFER
MAIN MEMORY
CPU'S
DISK MEMORY
Keyboard
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2
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FIG 1

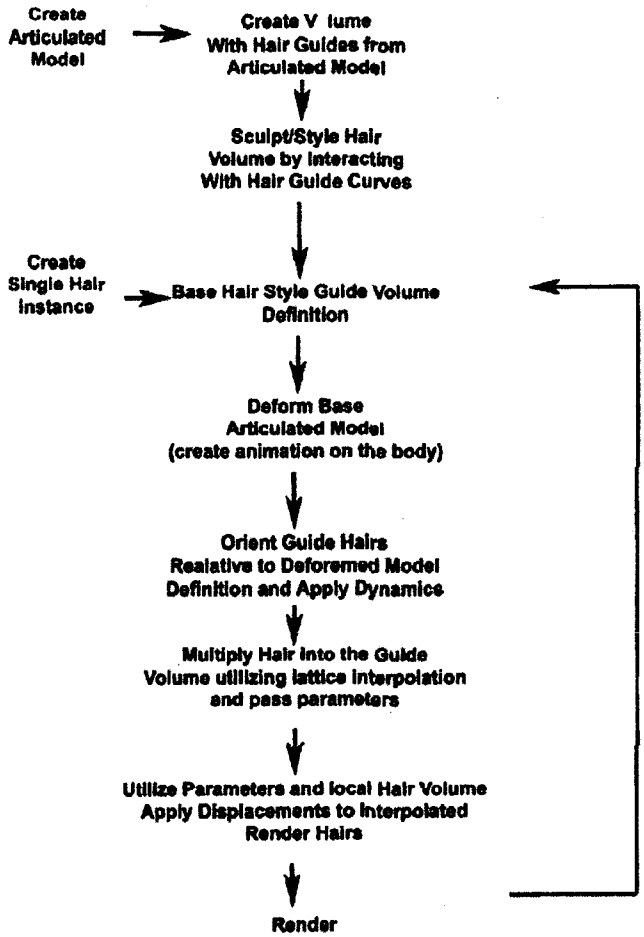
Create Articulated Model
Create V lume With Hair Guides from Articulated Model
Sculpt/Style Hair Volume by Interacting With Hair Guide Curves
Create Single Hair Instance
Base Hair Style Guide Volume Definition
Deform Base Articulated Model (create animation on the body)
Orient Guide Hairs Realative to Deforemed Model Definition and Apply Dynamics
Multiply Hair into the Guide Volume utilizing lattice interpolation and pass parameters
Utilize Parameters and local Hair Volume Apply Displacements to Interpolated Render Hairs
Render

FIG 2

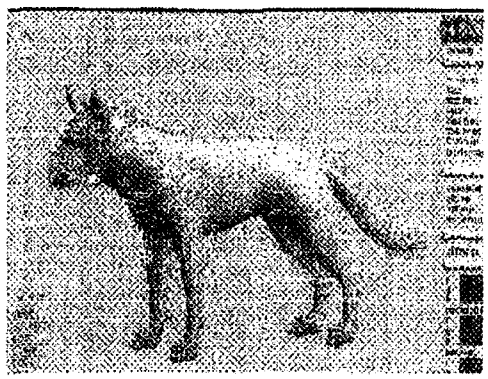

Fig 3



Fig 4

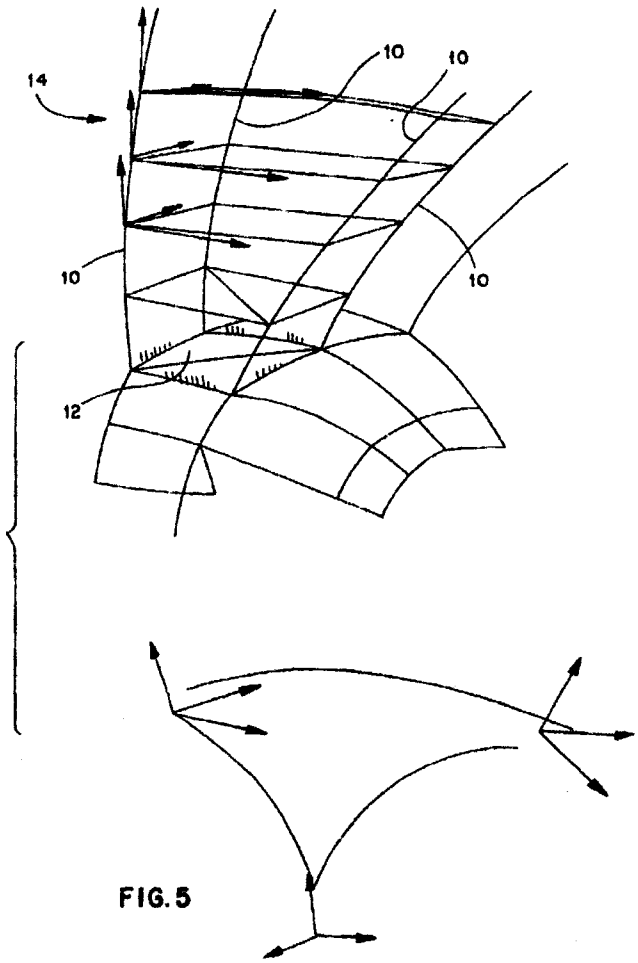


FIG. 5

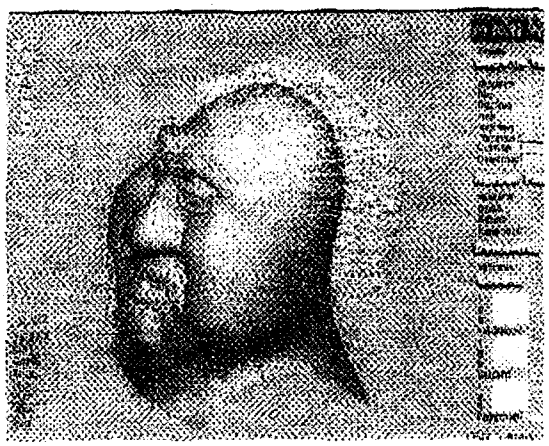

Fig 6



Fig 7

# HAIR GENERATION AND OTHER NATURAL PHENOMENA WITH SURFACE DERIVED CONTROL VOLUMES IN COMPUTER *GRAPHICS AND ANIMATION*

## FIELD OF THE INVENTION

The invention relates generally to the art of computer graphics and more particularly to the modeling and moving of large systems of geometry such as hair and fur which must extend naturally from an arbitrary surface. Such large systems in the natural world share properties with the shape of the underlying surfaces as well as the shape defined by the systems themselves. This invention relates to computer methods that can render and model deformable systems of geometry that have stable dynamics when viewing the object that has been rendered.

## BACKGROUND OF THE INVENTION

Modeling and moving extremely large systems of geometry in a stable surfaced based volume has been a central problem in computer graphics and computer animation systems. Hair, in particular, has long presented computer artists with intractable problems when trying to define, shape, and manipulate the millions of geometrical elements which comprise a usual occurrence of hair.

Problems arising from previous methods involve memory management of such large systems of geometry, efficient definition distortion required on a straight line required to create the geometry (like hair), and how to maintain proper orientation of the details of the geometry as it flexes and moves.

Coordinate systems in general are defined by three vectors which represent the pseudo x,y, and z axis respectively and scalars thereof. Most systems of derived matrices comprise only two vectors and an arbitrary "up" vector which is made perpendicular to the first two vectors by a cross product of the first two vectors. When placed in a matrix, the matrix defines a local coordinate system which may also be inverted. This means, that you can multiply a point in Cartesian space by a local matrix to perform local distortions of orientation and scale, and then return the point to Cartesian space by applying the inverse of the matrix to the point. A typical use of a local matrix is a rotation matrix, which is constructed from euler angles for the three axis, then applied to a set of points to orient an object in a local coordinate system. Another common use of a matrix is a perspective matrix. A perspective matrix contains the necessary distortion of Cartesian space to it's projection on a flat viewing plane, usually scaling points close to the plane larger, and ones further away smaller.

## PRIOR ART


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Hahn, James K., "Realistic Animation of Rigid Bodies," Computer Graphics (Siggraph '88 Conference Proceedings) 22:4:299–308 (Aug. 1–5, 1988) XP002084382.

Hoppe, Hugues, "View-Dependent Refinement of Progressive Meshes," Computer Graphics (SIGGRAPH 97 Conference Proceedings) pp. 189–198 (Aug. 3–8, 1997) XP002085290.

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Sederberg et al., *"Free-Form Deformation* of Solid Geometric Models," SIGGRAPH '86, ACM, vol. 20, No. 4, 1986, pp. 151–160.

The U.S. Pat. No. 6,037,949 and the U.S. Pat. No. 5,796,400 which are part of the prior art show use of texture mapping and other uses of scalar fields on subdivision surfaces. The methods, while different in the respect that they don't directly relate to dynamic computer generated hair, are relevant in the use of scalar fields and parameters which will be interpolated over a 2 dimensional surface in a 3D world space. Therefore they can be very instructive as to what is considered as skill in the art in terms of defining and computing the value of scalar fields over a set of points on a surface to *model or animate. These patents mention and* describe these techniques in computer graphics and computer animation as well as appropriate algorithms used by animators by people skilled in the art on a regular basis.

Since this patent application improves on these patents by *a method that uses mesh and coordinates, it is similar* to the prior art, but different in many respects based on using coordinates that have underconnectivity and using guide columns having the vector coordinates located thereon and deforming the columns and rendering as will be apparent *from the description in this application.*

## SUMMARY OF THE INVENTION

The present invention, by providing a method for defining stable and arbitrary coordinate systems comprised of a system of matrices that shares similarity with an underlying surface, allows for the pragmatic creation of temporary geometry which may be created on demand, deleted from memory, and repeated on demand with very few actual parameters, thus minimizing memory requirements for recalling such a large system of geometry in a piece-wise fashion.

Under such method, only a straight, undeformed version of a single instance of the geometry (a single hair for example), and the coordinate system described above, must be stored to create and render an infinite set of occurrences across the coordinate system, which provides shape in a volumetric way.

Previous methods use the decades old method of bump mapping, or 'Blinn Shading'. Blinn Shading is a method for creating the appearence of bumps on a surface as a shading artifact by 'wobbling' the normal of a surface, which is in-turn used to shade a point on the surface. The normal is 'wobbled' by constructing a coordinate system out of the underlying surface and rotating the normal vector. This provides us with a method by which we may perform certain distortions of the surrounding space by providing an anchor by which we may rotate and scale local to the root of a surrounding volume. For instance, if you were to grow a hair from a surface, you could then rotate it about it's root using the above method. This method solves for coordinate system of transformation at the root of the hair, but does not provide for the rest of the hair as the volume it creates only has similarity with the surface, and does not share any properties with the hair itself.

Another great difficulty in computer graphics simulation of large systems like hair, has been how to move the *geometry using physical simulation. This* type of arbitrary volume allows us to run conventional physical simulation on chains formed by the columns of this arbitrary lattice structure, thus distorting the very space that the large system of geometry is passed through allowing for a low resolution *definition of this very detailed system.*

A common way of representing a spatial distortion for a volume is an FFD (free form deformation lattice). FFD's have the limitation of a grid structure in their definition, and are not suitable for this type of deformation since the *underlying surface which drives the deformation may not be* connected in a grid-like fashion, such as in the case of a polygonal mesh. FFD's have been employed for distorting space extending from a spline patch primative, since patches have a grid like parameterisation, but this method will fail *where one patch edge meets another, because there is no* continuity across patch edges, FFD methods are extremely difficult to manage. With a coordinate system such as the one here described, by joining primitives at the base of the deformation space in an arbitrary way, we may have surface *continuity, thus spatial continuity as this connectivity* gets propagated up the lattice.

By using the underlying connectivity of the surface that this lattice is derived from at each segment of each column, the coordinate system gains the property of stable orientation *at each level of the lattice structure. This connectivity* simply points at the column's neighbor for what is known as an 'up vector' for an orienting matrix. In the case of hair, this system would share properties of both the underlying surface, as well as the hairs which are grown from said surface. *The combination of these two gives us a coordinate* system which may be derived, or re-derived (in animation) from changes in either the 'hair' or the surface.

Because this connectivity is static, severe motion and 'tangle' may be applied to the columns of this lattice structure without failure, *usually caused by a common* problem called 'gimbal lock' which usually occurs in simulated motion of chain-like kinematic structures. Gimbal lock problems happen because dynamic chains usually construct their orientation matrices with a static up vector, such as the 'y' axis. *Creating a matrix in this fashion requires a cross* product with the direction of the chain link. A static up vector like this will tend to produce a 180 degree flip in orientation when the chain faces in the same or nearly the same direction as the up-vector, which can occur frequently *in a large system such as hair.*

With the coordinate system described here, each link of the chain has it's own up vector based on it's connectivity with it's neighbors. Because of this, the possibility of a chain facing the same direction as it's up-vector is reduced by an enormous factor, and failures to produce a *valid orientation* matrix are virtually eliminated.

Another problem in computer graphics with large systems such as hair arises from not having coordinate systems which define an entire volume in this fashion and is one of 'styling'. Hair, for instance, has 'curl', and 'kink'. While these types of transformations may be easily described in Cartesian space, carrying them forward into the space of hair is impossible to do in any sort of stable manor without defining a smooth and stable volume of local coordinate systems by which we may *derive orientation and anchors for* such transformation at any point in the volume. This is particularly problematic when the hair is bending and twisting such as it does in a dynamic simulation, the coordinate system must contain properties of this movement to anchor and orient such *transformations locally throughout the sys-*

tern of the curls and kinks will appear to distort as the hair bends. Describing a stable, continuous coordinate system such as we describe solves for this problem and maintains proper shape as the hair bends and twists from an animated dynamic system.

Failure of previous methods is most apparent in highly flexible dynamic systems and limits them to relatively 'stiff' animation which is limited to flexibility with only very few degrees of freedom of motion. This type of coordinate system has no such limitations with respect to motion, flexibility and realistic simulation.

Another by-product of this approach is the ability to produce actual geometry with continuous and stable orientation along it's length, where previous approaches yield undesirable 'twists' and 'flips' because of their use of arbitrary up vectors for orientation.

## BRIEF DESCRIPTION OF THE DRAWINGS

*APPENDIX 1* includes two videos entitled "Dog" and "Zeke"

FIG. **1** shows generally the elements of a computer system suitable for carrying out the present invention.

*FIG. 2 is a flow chart of the process showing steps* to create and cause animated renderhairs whereby their motion is at least partially driven by the motion of the body or skin.

FIG. **3** shows the control point mesh of a dog's body.

FIG. **4** shows a dog with realistic hair created by the volume.

FIG. **5** shows a geometric surface with a column extending from the vertices of the segments of the surface and a schematic of a coordinate system used on said column.

FIG. **6** shows Zeke with the guide columns applied

FIG. **7** shows simulated trees created with the method.

## DETAILED DESCRIPTION OF AN *EXEMPLARY EMBODIMENT*

FIG. **1** shows a computer system suitable for carrying out the invention. A main bus **1** is connected to one or more CPU's **2** and a main memory **3**. Also connected to the bus are a keyboard **4** and large disk memory **5**. The frame buffer **6** receives output information from the main bus and sends it through another bus **7** to either a CRT or another peripheral which writes the image directly onto film. To illustrate the present invention we will describe its use in the animation of a character, Zeke and another character 'Fiasco'—a fluffy dog.

The first step involves the production of a 3 dimensional perpendicular lattice by extending linear segments from each vertex of the underlying surface (FIG. **3**). This technique can be seen in FIG. **5** where linear segments, **10**, in FIG. **5** are extended from the arbitrary surface, **12**, to form guide columns, **14**. Then, the next step involves connecting each level of each column to it's corresponding neighbors by simply using the underlying surface's connectivity to define it's connection. In an exemplary embodiment, 'Fiasco's' fur, depicted in FIG. **4**, the hair rendered contains approximately 5 million geometrical elements whose shape, size, color and material are defined by the control lattice in FIG. **3** and FIG. **5**.

Once the set of control points, polygons and creases defining the kinematic surface of 'Fiasco's' body are entered and stored in the computer, the computer animator must determine how each point is to move for each gesture or character movement. This step is done by coding animation controls, which effectuate transformations of the model corresponding to *different movements, e.g, left leg forward*, left leg backward. There are many means of defining this type of motion, but in 'Fiasco's' case they are provided by simple animated join rotations and interpolations.

The next step in FIGS. **3** and **4** is the in "motion" creation of a base coordinate system defined by 'Fiasco at rest' with re-orienting the columns, or guide hairs by using the underlying polygons and their normals as a base coordinate system for the column in a deformed state. This is referred to as "*deforming the surface geometry arbitrarily*" and then multiplying instance geometry throughout the volume using local coordinate systems, as shown in the flow chart of FIG. **2**. With the re-oriented coordinate systems with physical simulation, or dynamics, applied to the columns of the coordinate system. A moving simulation as shown in *Appendix 1* is attached.

The same methods can be applied to a character, 'Zeke', shown in FIG. **6** in Appendix 1 in the video entitled "Zeke", *in which the hair is long* and flexible. The animation shows how the inventive method shows the stability of said coordinate system in extreme situations in which it is flexed to large degrees of freedom.

These methods may be applied to any type of geometry, for instance, in the case of a single feather is instanced several hundred times over and deformed by the control lattice structure using his method. Also tornadoes have been created with this method by using such coordinate systems that can be used to provide form for animated graphical particle elements.

Defining Control Volume

The control volume, also referred to as coordinate system and lattice, were used at several points in the above described process in order to *define smoothly carrying* parameters on the large system of rendered hair which occupies this volume.

The control volume is defined in the above process, by 'growing' kinematic chains of 15 segments each from the surface normals of each vertex of the underlying model of 'Fiasco's' body, then orienting and 'grooming' these control chains, called 'guide hairs' using interactive sculpting techniques.

*The proprietary interface used above*, called 'shave and a haircut', allows for defining parameters including color, thickness, kink, frizz, stiffness, and density to each of the guide hairs, which may then be smoothly interpolated across the entire volume.

An interface, also provides a physical simulation to the 'guide hairs' to preview the hair's properties in motion.

Multiplication of Detail

In practice, the bounding volume created by the above *procedure allows* for the recursive instancing of a single hair, or other geometry, over an entire surface to create infinite detail limited only by visual requirements and computational speed and time limitations.

After a sufficient number of iterations to produce enough hairs, or elements, to *be visually satisfactory a system of* shading and self shadowing is applied by common buffer or drawing methods well known in the art.

As seen in the flow chart of FIG. **2**, and the animations in Appendix 1, it can be seen that we have created through use of the steps of creating a desired model by creating the deformable arbitrary volumes and using the method of creating a mesh that can be of any shape, and creating a coordinate system of interconnectivity with the matrices of *the guide columns through the use of defining parameters* for interpolation for the guide columns and thereafter deforming

the surface geometry and creating matrices for the new volume and thereafter multiplying instance geometry by newly defined matrices and thereafter rendering the new data created. In the process as seen in FIG. **5**, the hair is created by creating strands from the data at the new matrices wherein an up arrow is shown as being perpendicular to the hair vectors at each matrix to provide improved dynamic qualities as shown in the animations that have not been attainable until this process.

In reviewing this description, it is clear that by using the steps shown in the flow chart in FIG. **2** as well as explained throughout, this novel method can attain its objectives of not only rendering hair, but also tornadoes, as well as forests of trees, that formerly took millions of dollars of manpower and equipment to produce.

The specific arrangements and methods described herein are merely illustrative of the principles of the present invention. Numerous modifications in form and detail may be made by those of ordinary skill in the art without departing from the scope of the present invention. Although this invention has been shown in relation to particular embodiments, it should not be considered so limited. Rather, the present invention is limited only by the scope of the appended claims.

What is claimed is:

**1**. An improved method in the fields of computer graphics and animation for defining and maintaining a surfaced referenced control volume, for the purposes of creating computer graphic hair and other large geometric systems, comprising the following steps:

a. selecting an arbitrary three-dimensional geometric graphical surface having a surface topology comprising a set of interconnected surface vertices,

b. creating a plurality of geometric guide curves, each of said geometric guide curves having a root at one of said surface vertices with one or more segment divisions at regular intervals along said geometric guide curve,

c. using said surface topology to interconnect said geometric guide curves to form a layered lattice structure, whereby said geometric guide curves form columns of said layered lattice structure, said layered lattice structure having one or more layers at vertices of said segments of said geometric guide curve.

**2**. A method as defined in claim **1**, comprising the additional steps of:

a. defining a set of rendering parameters to be attached to said guide curves;

b. creating orientation matrices from junctions formed by said lattice structure from claim **1**;

c. creating a single instance geometry which contains the shape of an undeformed renderhair; and

d. creating a multiplied instance geometry by multiplying said single instance geometry of said undeformed renderhairs into a volume of said lattice structure using lattice interpolation, whereby said multiplied instance geometry inherits said local matrices and parameters at each vertex as a by product of said lattice interpolation.

**3**. A method as defined in claim **2**, comprising the further step of deforming and moving said guide columns and re-interpolating renderhairs.

**4**. A method as defined in claim **2**, wherein said volume retains a connection with the underlying surface and proper orientation to said surface is maintained by guide curves as the underlying surface is manipulated and moved.

**5**. A computer implemented method as defined in claim **1**, wherein said topology of said arbitrary three-dimensional geometric graphical surface represents contours of a body and wherein hair or fur of said body is represented by said guide columns.

**6**. A computer implemented method, as defined in claim **2**, wherein the properties of said hair can be varied.

**7**. A computer implemented method, as defined in claim **2**, wherein said hair and said geometrical surfaces having hair extending therefrom can be animated.

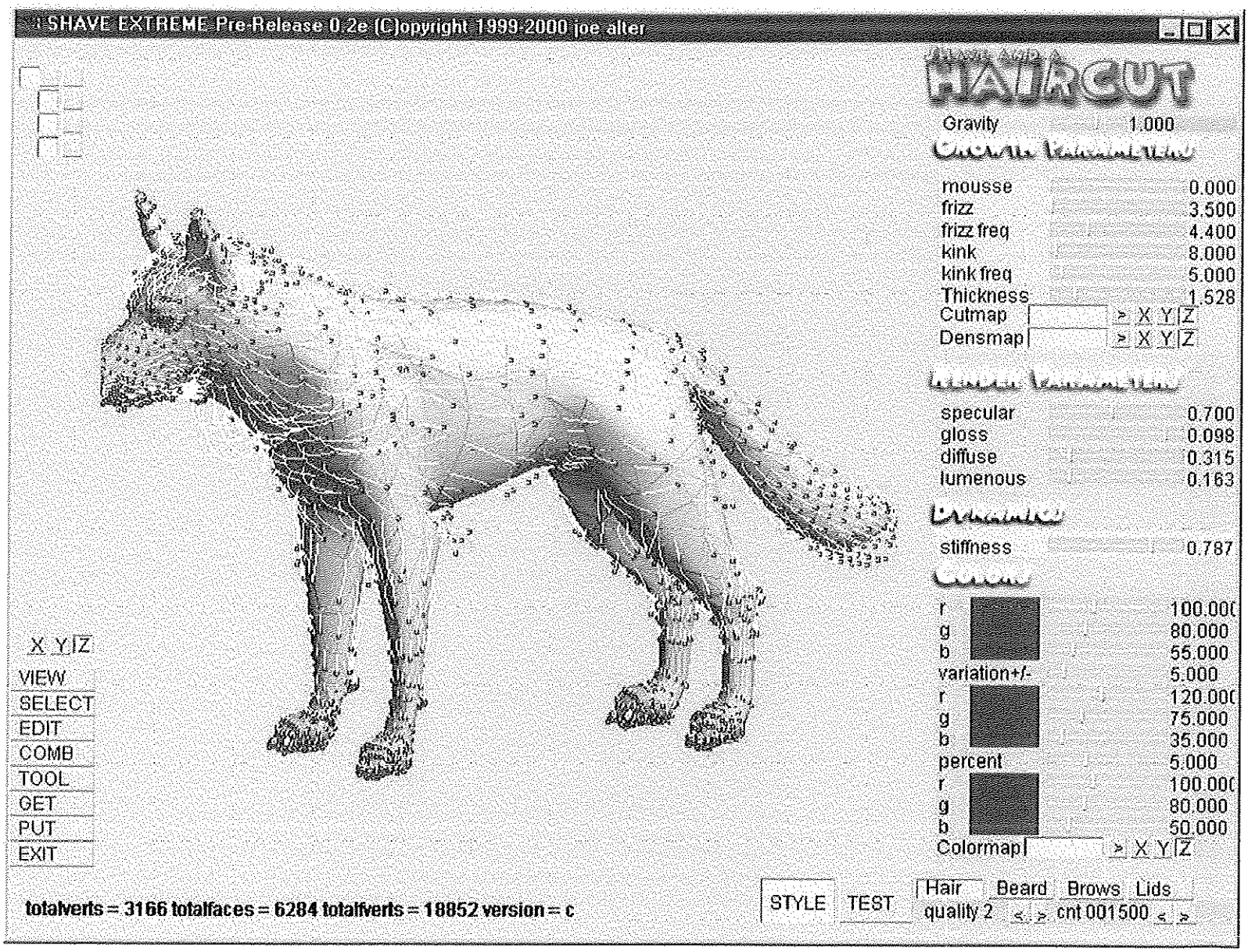
**8**. A computer implemented method as defined in claim **2**, comprising the additional step of utilizing interpolated property parameters and orientations to perform additional naturalistic displacements.

**9**. A computer implemented method as defined in claim **8**, wherein said naturalistic displacements are known as 'kink', 'frizz', and or 'clumping'.

**10**. A computer implemented method as defined in claim **1** for creating a control volume composed of a plurality of guide curves, then using said volume to control the paths of particulate matter including dust, smoke and or other debris.

* * * * *

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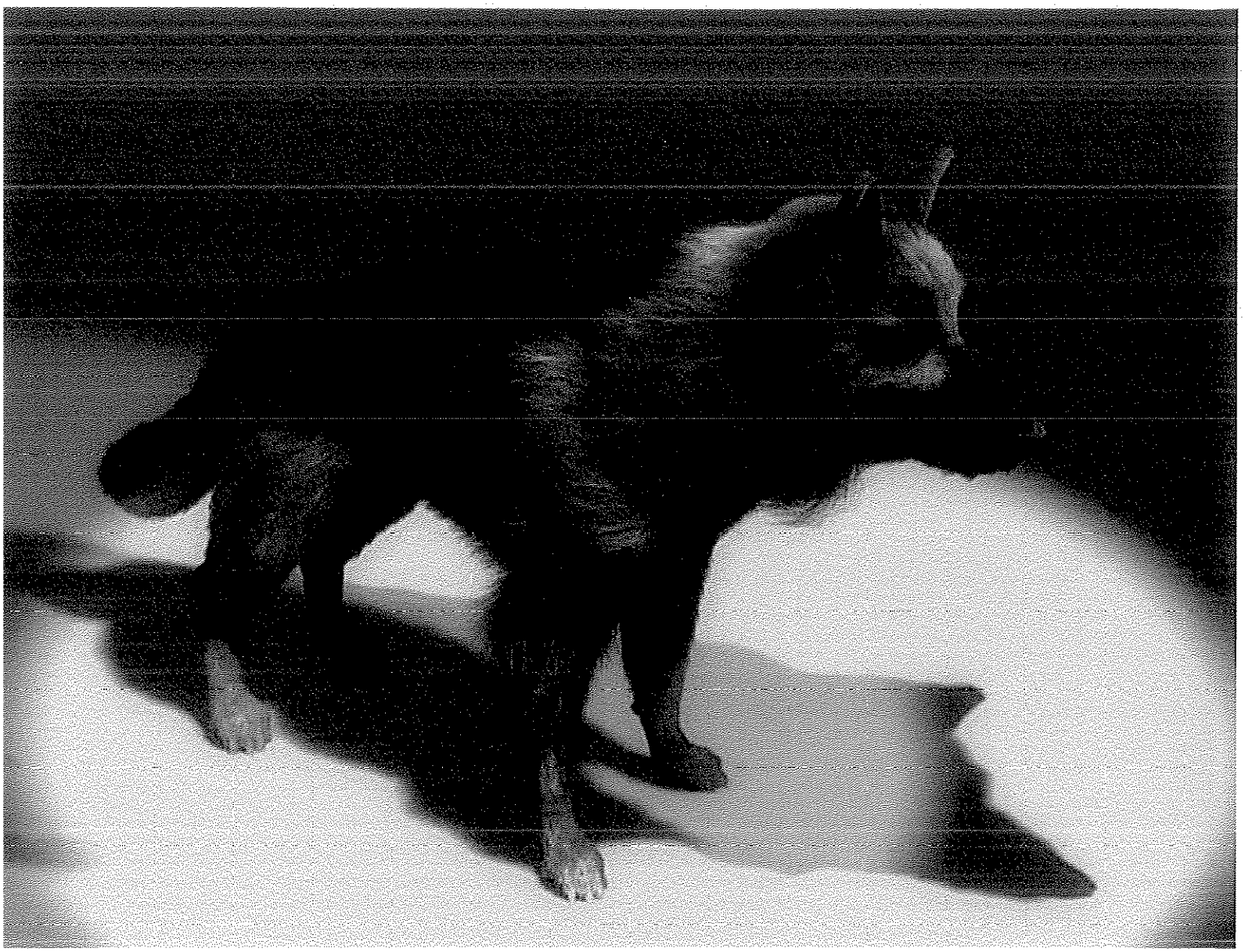



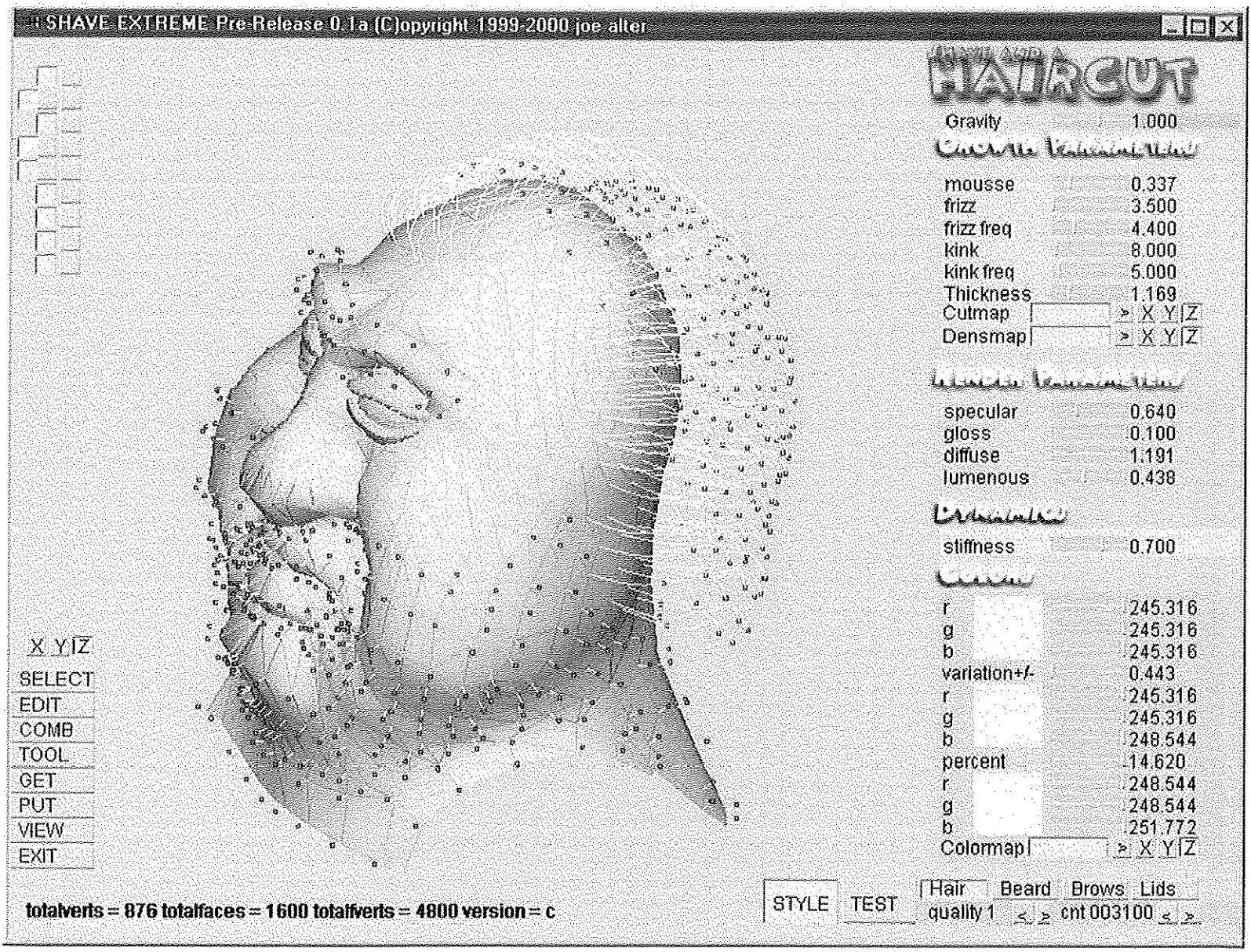
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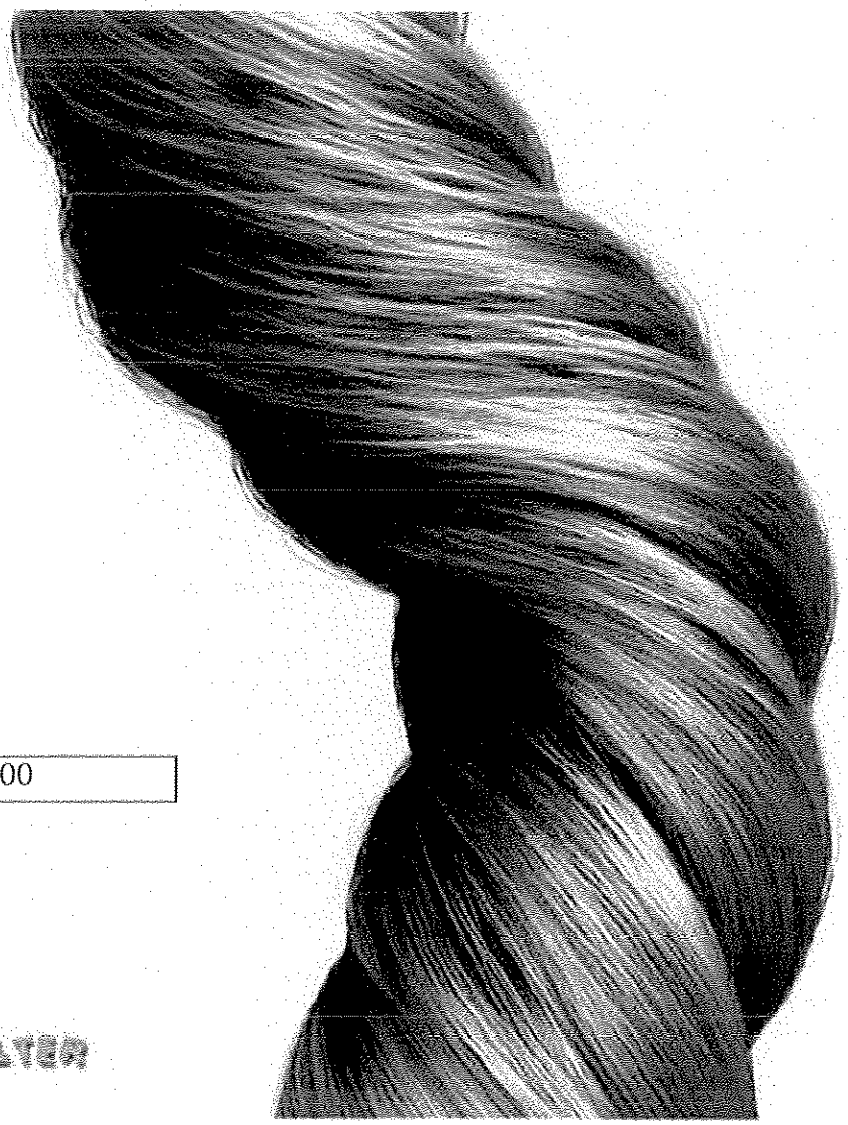
Exhibit B

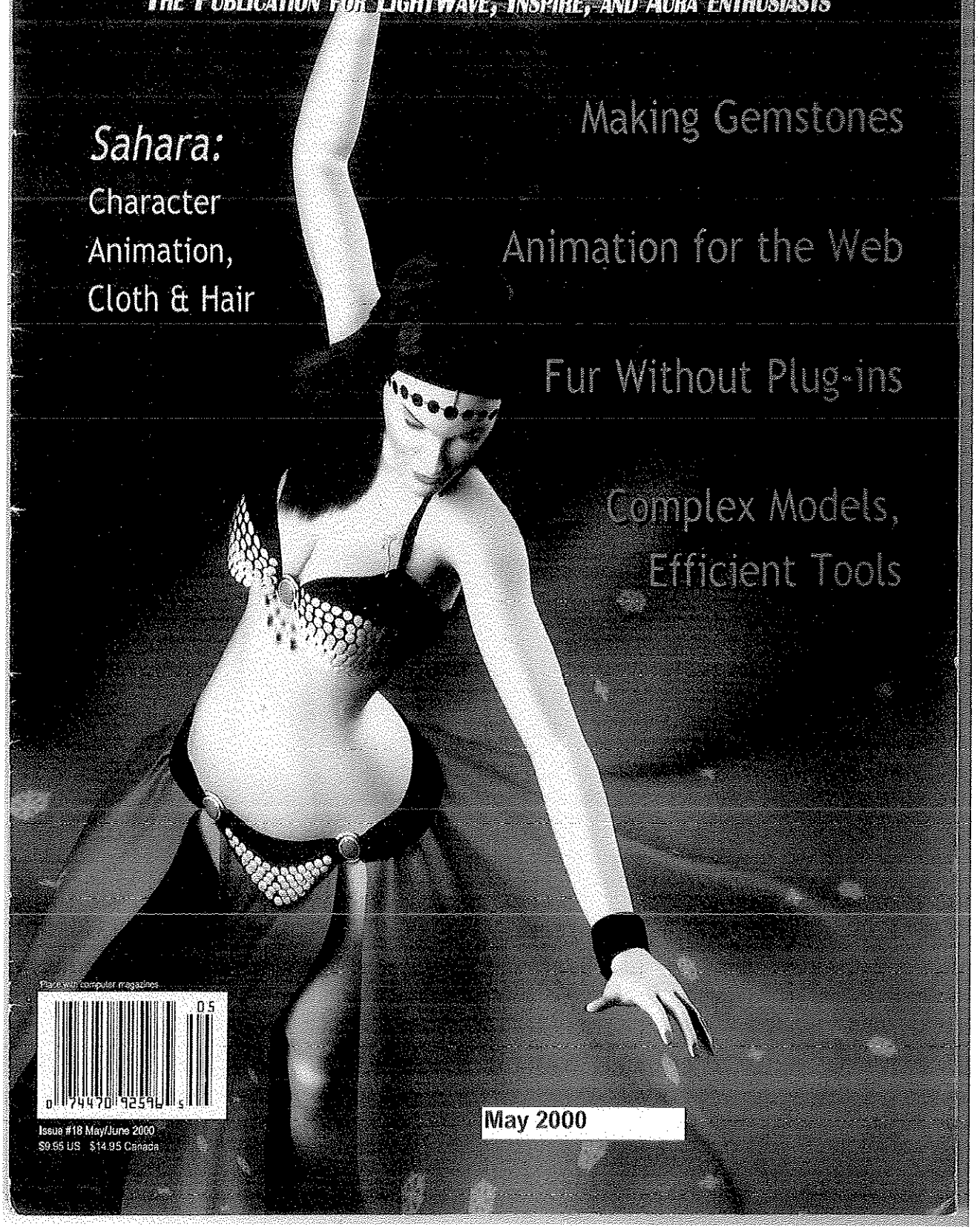


Feb 2000

JOE ALTER

# KEYFRAME
MAGAZINE

THE PUBLICATION FOR LIGHTWAVE, INSPIRE, AND AURA ENTHUSIASTS



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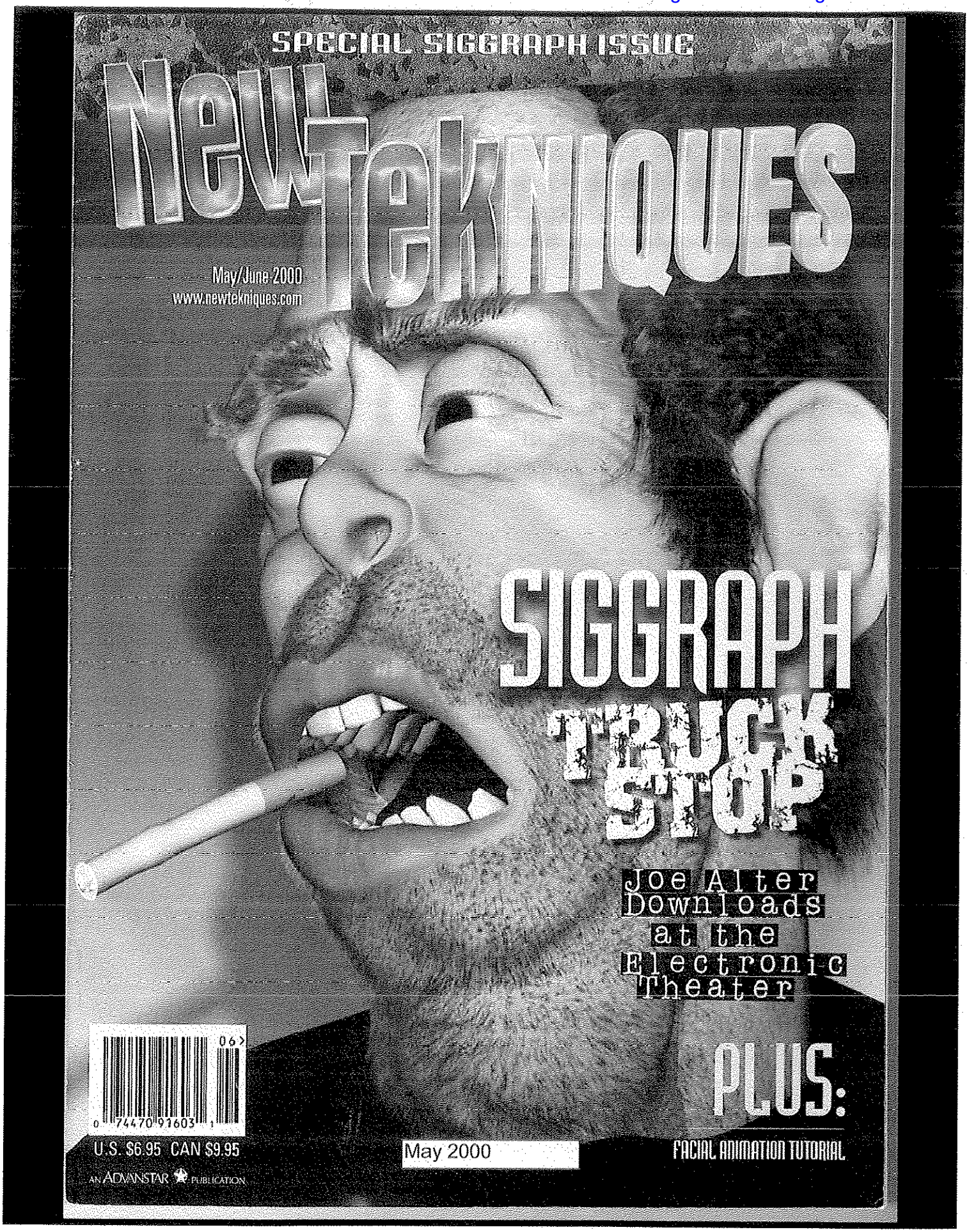
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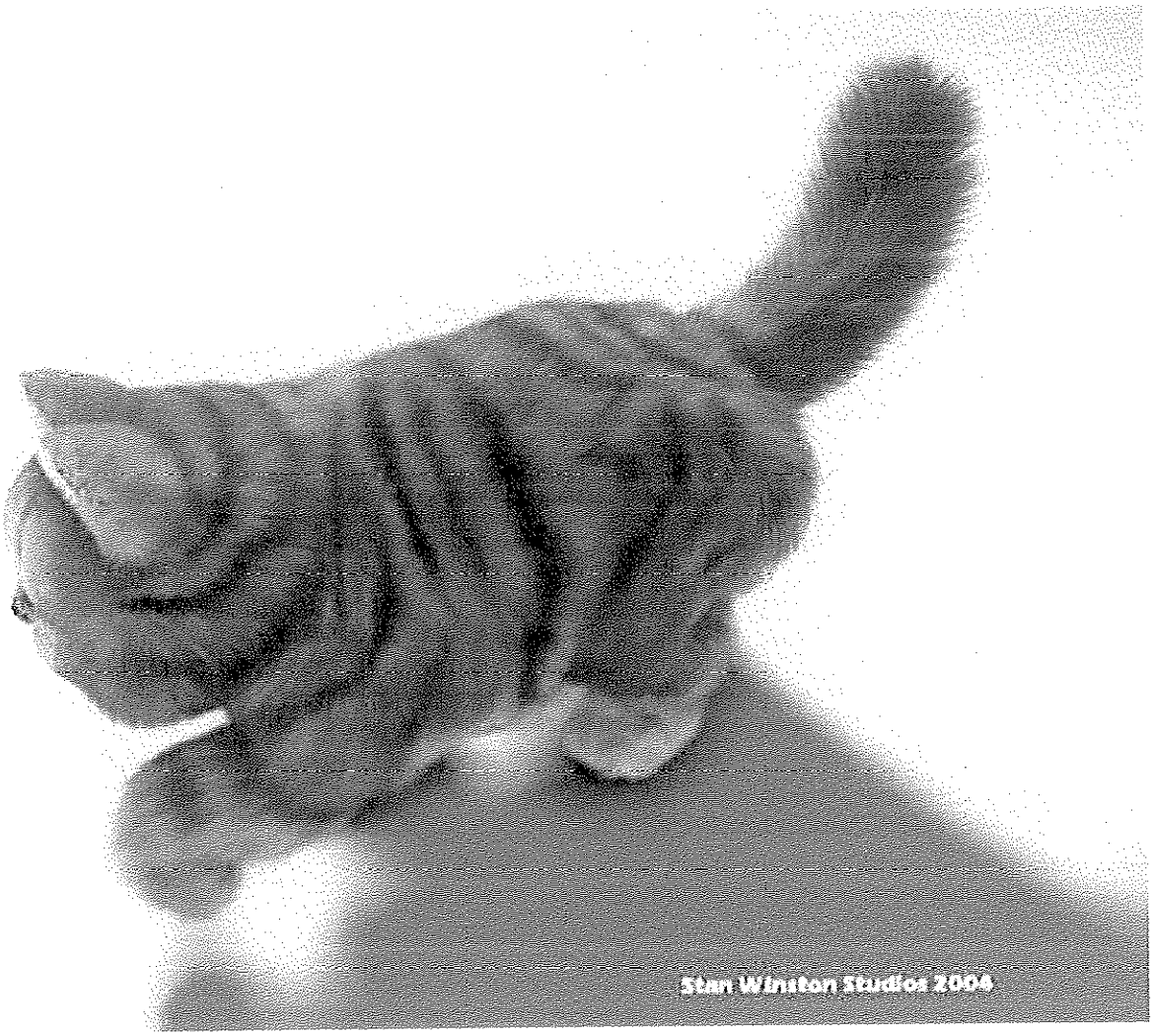
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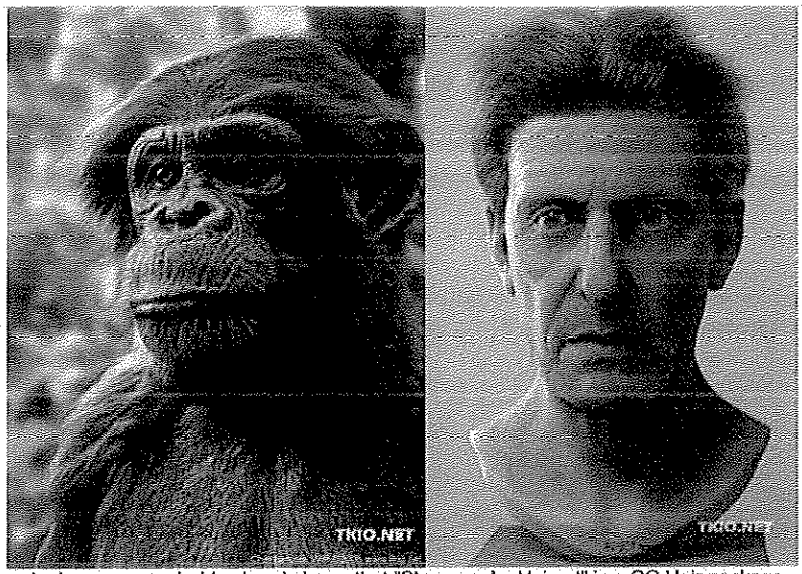
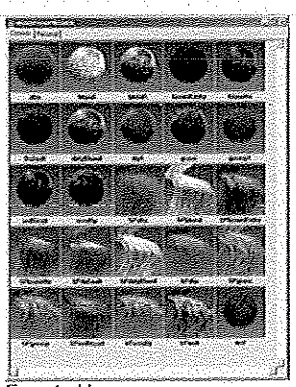
# RENDERING




If you're here, you probably already know that "Shave and a Haircut" is a CG Hair package famous for its sculpting and dynamics tools, but you may be aware that it is also a highly advanced render...



Easy to Use ..
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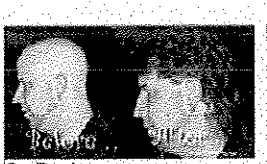

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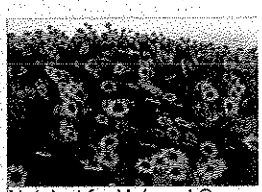
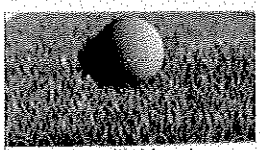
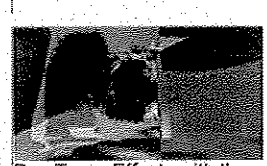


Not Just for Hair and Grass You can actually replace hairs with any geometry you can model.

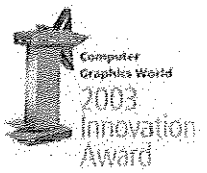


Integrates with Maya's render and 2D post effects Shave's render, built into a volumetric plug-in, obviously integrates tightly with Maya's own. Unlike Maya Fur, it even supports objects with transparency Additionally, it integrates with Maya 2D post process effects like depth of field.



Ray Trace Effects with the Maya render. Shave ships with it's own ray tracer in a volumetric shader. You can use it for secondary hair reflections.



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US Patent 6,720,962

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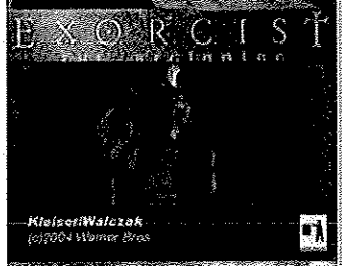


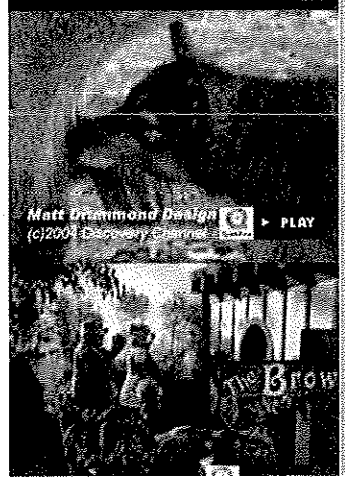

Exhibit "C"

**joe alter**

**From:** joealterinc@hotmail.com
**Sent:** Friday, April 23, 2004 6:29 AM
**To:** ec@pixar.com
**Cc:** lc@pixar.com
***Subject:*** hair technology

Dear Mr. Catmul,

Just to 'bookend' our previous conversations about my hair technology, I'm delighted to inform you that I did infact receive a patent for it last week.

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=/netahtml/search-bool.html&r=1&f=G&l=50&co1=AND&d=ptxt&s1=6,720,962&OS=6,720,962&RS=6,720,962

Regards,

Joe Alter

Correspondence with Ed Catmul, then CEO Pixar, now CEO Disney And Loren Carpenter - Cheif Scientist, Pixar

File U/Patent

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To: "joe alter, inc" <joealterinc@hotmail.com>
X-Mailer: Apple Mail (2.606)
Return-Path: ec@pixar.com
X-OriginalArrivalTime: 17 Nov 2003 16:53:26.0811 (UTC) FILETIME=[520A46B0:01C3AD2B]

**joe alter**

**From:** joealterinc@hotmail.com
**Sent:** Thursday, November 13, 2003 7:32 PM
**To:** ec@pixar.com
**Subject:** shave and a haircut

Dear Mr. Catmul,

You and I exchanged some email a couple years back regarding my CG hair technology. ( http://www.joealter.com )

My wife and I have recently moved to San Francisco, and I'd love to come by Pixar and give a demo of the software - is that something you'd be interested in having a look at?

*regards,*

joe alter
415-831-4717

**joe alter**

**From:** EC [ec@pixar.com]
**Sent:** Monday, November 17, 2003 8:52 AM
**To:** joe alter, inc
**Subject:** Re: shave and a haircut

Joe,

Our next movie has over a hundred humans in it and we have our own inhouse animation
system. So we have already written a major hair system based on technology we developed
for our previous films. We couldn't even consider an alternate approach at this time.

Thanks,
Ed

On Nov 13, 2003, at 7:32 PM, joe alter, inc wrote:

>
> Dear Mr. Catmul,
>
> You and I exchanged some email a couple years back regarding my CG
> hair technology.
> ( http://www.joealter.com )
>
> My wife and I have recently moved to San Francisco, and I'd love to
> come by Pixar and give a demo
> of the software -- is that something you'd be interested in having a
> look at?
>
>
> regards,
>
> joe alter
> 415-831-4717
>
>
> _____
> Concerned that messages may bounce because your Hotmail account is
> over limit? Get Hotmail Extra Storage!
> http://join.msn.com/?PAGE=features/es
>

Exhibit "D"

O'MELVENY & MYERS LLP

BEIJING
CENTURY CITY
HONG KONG
IRVINE SPECTRUM
LONDON
LOS ANGELES

Embarcadero Center West
275 Battery Street
San Francisco, California 94111-3305
TELEPHONE (415) 984-8700
FACSIMILE (415) 984-8701
www.omm.com

NEWPORT BEACH
NEW YORK
SHANGHAI
SILICON VALLEY
TOKYO
WASHINGTON, D.C.

July 20, 2004

OUR FILE NUMBER
673720-13

Joseph Alter,
Chief Executive Officer
Joseph Alter, Inc.
730 Shrader Street
San Francisco, California 94117

WRITER'S DIRECT DIAL
(415) 984-8904

WRITER'S E-MAIL ADDRESS
markmiller@omm.com

**Re: Pixar**

Dear Mr. Alter:

We represent Pixar and we have received a copy of your letter of July 2, 2004 to Susan Decker. Please direct all future correspondence regarding patent matters to our attention.

Pixar values intellectual property rights and recognizes that a there is a duty to disclose information relevant to the examination of a patent application to the United States Patent & Trademark Office. Pixar intends to comply with any such duty that may arise. However, we do not agree with your assertion that Pixar has any duty to *amend* any of Pixar's patent applications -- please note that the citation of relevant information is not an amendment -- or your assertion that the failure to disclose information is "fraud and will be damageable." Importantly, this letter is not and should be construed as an indication that United States Patent No. 6,720,962 is relevant to any of Pixar's pending patent applications.

Pixar has no duty or other obligation to cite your patent in any "related papers, tech awards and lectures." In this regard, Pixar is not currently aware of any contribution that you have made to any papers or lectures authored by Pixar employees or to the work at Pixar that resulted in any award.

We trust that this letter addresses the issues that you have raised.

Sincerely,

Mark E. Miller
of O'MELVENY & MYERS

MEM:rs
SF1:553962.1

Joe Alter
Joseph Alter, Inc
730 Shrader St.
San Francisco, CA
94117
415-831-4717

Susan Decker
Legal Affairs
Pixar
1200 Park Ave
Emeryville, CA 94608
510) 752-3000
fax 510)752-3151

July 2, 2004

Sent via fax and fedex

Dear Ms. Decker:

It has come to my attention that Pixar Animation Studios may be seeking a U.S. patent on materials which are directly related to my US patent # 6,720,962, "**Hair generation and other natural phenomena with surface derived control volumes in computer graphics and animation**" in connection with the productions "**Monsters Inc**" and "**The Incredibles**". Relevant items include but are not limited to Pixar's pending patent on "Collision Fly Papering".

I am writing this letter to make sure that my patent is indeed cited in any related Pixar patent application, as well as any and all related papers, tech awards and lectures.

As I'm sure you are aware, failure to cite such related patents discovered before or during the patent application process all the way up until a certificate is issued is *fraud and will be damageable*, so I'm confident that you will take steps to correct the situation immediately. If there is a pending application, it is your duty as an applicant to amend it immediately.

At your earliest convenience, I would appreciate some indication that this has matter has been properly reviewed by all appropriate parties. Thank you for taking time to review this matter, and I would be happy to discuss any kind of compromise which could be reached.

Respectfully,

Joe Alter,
CEO
Joseph Alter, Inc

cc:iw, ica

Joe Alter, Inc
1412 Oldbury Pl
Westlake Village, CA
91361
310-751-4927
joealterinc@gmail.com

Disney Legal
Buena Vista, FLA
fax : 407-934-8889

cc: Autodesk lega via Ken Pimentel

re: patent # 6,720,962 possible infringement +

8/12/2001

To Whome It May Concern,

I was surprised to learn at Siggraph (a yearly graphics conference) via press release - that Disney has signed a licensing deal with Autodesk for the inclusion into the Autodesk software product "Maya", for Disney Feature's 'arbitrary primitives generator' tool which was used (most recently) in Tangled. It surprised me, because I have a very similar tool (in fact the name and function of Disney's tool is straight out of my patent for crying out loud) which has been used by Autodesk since 2001 in their products 3d Studio Max, Max Vis, Softimage XSI, and I sell it as a 3rd party product with some success for Maya (all autodesk).

I have had my product on the market since march 2001. It has been widely known in the industry and has even been in use in every Disney production office including Pixar, Image Movers Digital, Prana Studios, and Disney Television. I have done demos at Pixar in person, and have spoken with engineers in as much detail as they requested about how my tools work and what they do in good faith as I would with any other customer who is not in competition with me, including flying up to Pixar (at their invitation - and my expense) to show the tool to an auditorium filled with their engineers who asked an hour's worth of questions.

I've been aware of the Disney tool's existence since 2004, and their Siggraph paper, however, at that time the paper outlined a tool that was very crude and light years behind ours. More recently I've become peripherally aware of the software's current similarity when they applied (against us) for an Academy Award for scientific achievement in film.
Additionally, it is my belief that this licensing deal is direct "payback" for shooting down their award with a submission of prior art.

I'm a fan of Disney's (and Pixar's), and I value them and Autodesk as clients. I'm not a litigious guy. But I do have a patent on this stuff (issued in 2004), and you guys aren't just using this tool in production anymore, but your engineers are intentionally aiming to squeeze me out of a software market that pays my bills and usurp credit for an invention that is not of their own making. I not only sell this product for Maya, but Autodesk already licenses it for all their other packages. This agreement engages in an activity that really will back me into a corner and leave me few choices.

I don't think finding contingent fee legal assistance against Disney/Autodesk for this kind of case will be a challenge, but once I pull that trigger it will be out of my hands and they will be likely to go after any damages they can get their hands on - which may not be limited to software licensing but could include box office revenues.

The sci-tech thing really pissed me off (considering you guys made me sign an NDA saying that I couldn't advertise that you guys were customers before buying the tool), but this actually threatens my

likelihood.

So, I'm writing this letter now, hoping that it's not too late to mitigate damage to either of us before we start trotting out the Lanham Act (sec 43A), patents, Adesk VS Vermont Microsystems, etc.

This kind of suit is not in my interest, I have a long career in graphics and animation and I'd really not like to limit my ability to work in the field in the future with this kind of lawsuit.

Please don't do this. You are needlessly exposing yourselves to risks that you may not have anticipated, and which I do not want to pursue, at all.

Regards,

Joseph Alter
www.joealter.com



The Walt Disney Company
**Stuart T. Langley**
Executive Counsel

**CONFIDENTIAL - SUBJECT TO F.R.E. 408**

August 18, 2011

Mr. Joe Alter
Joe Alter, Inc.
1421 Oldbury Place
Westlake Village, CA 91361

**Re: August 12 letter regarding Patent 6,720,962**

Dear Mr. Alter:

In your letter of August 12 you identified U.S. Patent 6,720,962 which you believed is relevant to a recently announced license between Disney and Autodesk related to our XGen technology. Disney takes intellectual property issues very seriously and would not knowingly use technology covered by a valid and unlicensed patent claim. I have reviewed your patent claims and, while both your patent and the XGen technology share the objective of growing and grooming hair, the similarity appears to end there. Your patent claims relate to a particular way of accomplishing these objectives, but the XGen technology uses very different techniques.

We give your allegations and concerns due respect, but to proceed further please have your patent counsel contact me and provide claim charts and any other analysis that would help us better understand your claim. I also ask that your patent counsel tell us what you propose as a resolution. If we do not hear from you in the next two weeks we will consider this matter closed.

Please direct all future communications and correspondence to my attention (my contact information is included below).

Best regards,

Stuart T. Langley
The Walt Disney Company
Patents Department
500 S. Buena Vista Street, MC 0762
Burbank, CA 91521-0762
Tel: 818-560-8452 / Fax: 818-560-5530
Email: stuart.langley@disney.com

cc: Ivan Ruzics / Disney Legal
Mary Ruijs /Autodesk Legal

Joe Alter, CEO
Joseph Alter, Inc
1412 Oldbury Place
Westlake Village, CA
91361
www.joealter.com
joealterinc@gmail.com
310-751-4927

Stuart T Langley
The Walt Disney Company
Patents Department
500 S. Buena Vista Street, MC 9762
Burbank, CA 91521-0762
Tel: 818-560-8452
Fax: 818-560-5530

Aug 31, 2011

Dear Mr. Langley,

In response to your Aug 18 letter, I've provided here some of the information you've requested.

Even our product doesn't still do everything in *precisely* the same was as outlined in the patent, however those improvements are mostly evolutionary. It is my feeling that the systems described in these papers and exhibits (attached) do not show methods that are substantially different from the ones described in the patent.

The attached articles are a bit old, and do not show the tools in action, however I suspect we'd see a quite substantially similar workflow and experience from the artist's point of view to our product as it exists today. Even your own press describes the advances since these papers as 'evolutionary'.

I see no basis whatsoever for your claim that they share nothing in common, and feel the *doctrine of equivalents* well covers details that are different and I think that there's more than enough here to get through *Markman.*

Both their system and ours appear to go about things in demonstrably substantially similar ways, operate on the same concepts and assumptions, produce substantially the same results and share the same set of aspirational goals.

I look forward to hearing your further thoughts, I am amenable to any fair solution or settlement you may have to offer so long as we can get this sorted out quickly.

Regards,

Joe Alter, CEO
Joseph Alter, Inc

# Claim Chart for US Patent 6720962

"Hair generation and other natural phenomena with surface derived control volumes in computer graphics and animation"

| Claim Language | |
|---|---|
| Claim 1 | |
| 1. An improved method in the fields of computer graphics and animation for defining and maintaining a surfaced referenced control volume for the purposes of creating computer graphic hair and other large geometric systems, comprising the following steps: a. selecting an arbitrary three-dimensional geometric graphical surface having a surface topology comprising a set of interconnected surface vertices, b. creating a plurality of geometric guide curves, each of said geometric guide curves having a root at one of said surface vertices with one or more segment divisions at regular intervals along said geometric guide curve, c. using said surface topology to interconnect said geometric guide curves to form a layered lattice structure, whereby said geometric guide curves form columns of said layered lattice structure, said layered lattice structure having one or more layers at vertices of said segments of said geometric guide curve. | |
| Claim 2 | |
| 2. A method as defined in claim 1, comprising the additional steps of: a. defining a set of rendering parameters to be attached to said guide curves; b. creating orientation matrices from junctions formed by said lattice structure from claim 1; c. creating a single instance geometry which contains the shape of an undeformed renderhair; and d. creating a multiplied instance geometry by multiplying said single instance geometry of said undeformed renderhairs into a volume of said lattice structure using lattice interpolation, whereby said multiplied instance geometry inherits said local matrices and parameters at each vertex as a by product of said lattice interpolation. | |

| | |
|---|---|
| Claim 3 | |
| 3. A method as defined in claim 2, comprising the further step of deforming and moving said guide columns and re-interpolating renderhairs. | |
| Claim 4 | |
| 4. A method as defined in claim 2, wherein said volume retains a connection with the underlying surface and proper orientation to said surface is maintained by guide curves as the underlying surface is manipulated and moved. | |
| Claim 5 | |
| 5. A computer implemented method as defined in claim 1, wherein said topology of said arbitrary three-dimensional geometric graphical surface represents contours of a body and wherein hair or fur of said body is represented by said guide columns. | |
| Claim 6 | |
| 6. A computer implemented method, as defined in claim 2, wherein the properties of said hair can be varied. | |
| Claim 7 | |
| 7. A computer implemented method, as defined in claim 2, wherein said hair and said geometrical surfaces having hair extending therefrom can be animated. | |
| Claim 8 | |
| 8. A computer implemented method as defined in claim 2, comprising the additional step of utilizing interpolated property parameters and orientations to perform additional naturalistic displacements. | |
| Claim 9 | |
| 9. A computer implemented method as defined in claim 8, wherein said naturalistic displacements are known as `kink`, `frizz`, and or `clumping`. | |
| Claim 10 | |
| 10. A computer implemented method as defined in claim 1 for creating a control volume composed of a plurality of guide curves, then using said volume to control the paths of particulate matter including dust, smoke and or other debris. | |