

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIGHTRICKS LTD.,
Petitioner,

v.

PLOTAGRAPH, INC. and SASCHA CONNELLY,
Patent Owners

IPR2023-00568
U.S. Patent No. 11,182,641

**PATENT OWNERS PLOTAGRAPH, INC. AND SASCHA
CONNELLY'S RESPONSE UNDER 37 C.F.R. §42.107**

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CLAIM LISTING
For IPR2023-00568
U.S. Patent No. 11,182,641

Claim	Limitation No.	Limitation
1	1- preamble	A computer system providing, to a client computing device, software for automating a shifting of pixels within a video file, the computer system comprising: one or more processors; and one or more computer-readable media having stored thereon executable instructions that are transmitted to the client computing device for execution by one or more client processors on the client computing device, the executable instructions comprising instructions that when executed by the one or more client processors configure the computer system to perform at least the following:
	1a	access, from memory, a digital image file, wherein the digital image file comprises information that corresponds to individual pixels the digital image file;
	1b	receive a first starting point through a user interface, wherein the first starting point is received through a user selection of a first beginning portion of a first image frame;
	1c	receive a first ending point through the user interface, wherein the first ending point is received through a user selection of a first ending portion;
	1d	create a first digital link between the first starting point and the first ending point, wherein the first digital link comprises: a first direction extending from the first starting point to the first ending point; and a first length between the first starting point and the first ending point;
	1e	identify a first set of pixels that lie along the first digital link between the first starting point and the first ending point; and
	1f	shift the first set of pixels in the first direction.
2		The computer system of claim 1, wherein the first ending portion comprises a particular portion of the first image frame.

3		The computer system of claim 1, wherein the digital image file comprises a video file and the first image frame comprises a first video frame of the video file.
4		The computer system of claim 3, wherein the first ending portion comprises a particular portion of a second video frame within the video file.
8		The computer system of claim 1, wherein shifting the first set of pixels comprises rendering in a loop the first set of pixels being shifted within the first image frame.
9	9a	The computer system of claim 1, wherein the executable instructions include instructions that are executable to configure the computer system to: receive a second starting point through the user interface, wherein the second starting point is received through a first use selection of a second beginning portion of the first image frame;
	9b	receive a second ending point through the user interface, wherein the second ending point is received through user selection of a second ending portion;
	9c	create a second digital link between the second starting point and the second ending point, wherein the second digital link comprises: a second direction extending from the second starting point to the second ending point; and a second length between the second starting point and the second ending point;
	9d	identify a second set of pixels that lie between the second starting point and the second ending point; and
	9e	shift the second set of pixels in the second direction.
10		The computer system of claim 9, wherein the first direction is different from the second direction.
11		The computer system of claim 9, wherein a magnitude of the shifting of the first set of pixels is proportionally related to the first length and a the magnitude of the shifting of the second set of pixels is proportionally related to the second length.

12	12-preamble	A computer program product comprising one or more non-transitory computer storage media having stored thereon computer-executable instructions that, when transmitted to a remote computer system for execution at a processor cause the remote computer system to perform a method for automating a shifting of pixels within an image file, comprising:
	12a	receiving a first indication of a first starting point through a user interface, wherein the first starting point is received through a user selection of a first portion of a first image frame;
	12b	receiving, through the user interface, a first direction associated with the first starting point;
	12c	creating a first digital link extending in the first direction from the first starting point;
	12d	selecting a first set of pixels that are along the first digital link and extend in the first direction away from the first starting point; and
	12e	shifting the first set of pixels, in the first image frame, in the first direction.
13	13a	The method, as recited in claim 12, further comprising receiving an indication to generate a first mask over a second portion of the first image frame,
	13b	wherein pixels under the first mask are prevented from shifting.
14		The computer program product as recited in claim 13, further comprising computer-executable instructions that, when transmitted to the remote computer system for execution at the processor, cause the remote computer system to perform a method for automating the shifting of pixels within the image file, the method comprising receiving through the user interface a selection of the second portion of the first image frame around which the first mask should be generated.
15	15a	The computer program product of claim 14, further comprising computer-executable instructions that, when transmitted to the remote computer system for execution at the processor, cause the remote computer system to perform a method for automating the shifting of pixels within the image file, the method comprising: identifying one or more edges that form a first boundary around the second portion; and
	15b	generating the first mask to cover area within the first boundary.

19	19 preamble	A method for transmitting to a client computing device instructions for shifting pixels within a video file, comprising: transmitting computer executable instructions to a client computing device, the computer executable instructions configured to cause the client computing device to:
	19a	access, from memory, a digital image file, wherein the digital image file comprises information that corresponds to individual pixels within a frame of the digital image file;
	19b	receive a first starting point through a user interface, wherein the first starting point is received through a user selection of a first beginning portion of a first image frame;
	19c	receive a first ending point through the user interface, wherein the first ending point is received through a user selection of a first ending portion;
	19d	create a first digital link between the first starting point and the first ending point, wherein the first digital link comprises: a first direction extending from the first starting point to the first ending point; and a first length between the first starting point and the first ending point;
	19e	identify a first set of pixels that lie along the first digital link between the first starting point and the first ending point; and
	18f	shift the first set of pixels in the first direction.
20		The method of claim 19, wherein the digital image file comprises a video file and the first image frame comprises a frame of the video file.

Patent Owners Plotagraph, Inc. and Sascha Connelly (collectively “Patent Owner”) hereby submits this Response to the Petition filed by Lightricks Ltd. (“Petitioner”) on April 11, 2023 in IPR2023-00568 for review of claims 1-4, 8-15, and 19-20 of U.S. Patent No. 11,182,641 (the ‘641 Patent).

I. Introduction

The Institution Decision determined that the Petition showed a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged based on the IMU-Okabe and IMU-Okabe-Li grounds. As a result, the Board did not address Petitioner’s challenges based on the Adobe After Effects Help and tutorials, Adobe (2013)(EX 1003)(hereinafter “AEM”). However, Patent Owner will address each of the three asserted grounds herein.

Patent Owner submits that the cited prior art fails to teach or suggest a number of elements that are required by all of the challenged claims of the ‘641 Patent. First, the prior art does not teach or suggest receiving starting or ending points through a user interface or the creation of a digital link between a starting and ending point. The prior art also fails to teach or suggest identifying or selecting a first set of pixels which lie along the digital link

which extends between the first starting and ending points. The prior art also fails to teach or suggest shifting the first set of pixels in the first direction of the digital link.

With regard to claim 8, none of the cited references teach or suggest at least the element of shifting a set of pixels by rendering the pixels “in a loop” as recited in claim 8. Dr. Greenspun’s supporting Declaration for Petitioner describes use of the Adobe After Effects CS6 and ImageMagick programs to perform processes which allegedly can move a pixel (Deform pin) from a starting point to an ending point and then return it to the starting point. This movement is then repeated. Dr. Greenspun’s movement of the Deform pin is from a starting point to an ending point and then repeating this movement. However, such movement of a pixel is not shifting “in a loop” as required by the claims and as described in the ‘641 Patent specification. Because the pixels in Petitioners’ cited references are not ever shifted “in a loop” the Petitioner’s challenge fails as to claim 8.

With regard to claim 13, the prior art fails to teach the creation of a mask such that pixels covered by the mask are “prevented from shifting.” The claim requires that covered pixels be prevented from shifting, and there is no proof at all that any covered pixels are so prevented.

II. Petitioner Has Not Shown Unpatentability of Any Challenged Claim of the ‘641 Patent

A. Overview of the ‘641 Patent

1. The Specification

The specification of the ‘641 Patent describes how a user can use the tools of paths (or digital links) with starting and ending points and masks to automate the shifting of pixels within a digital image. In specification of the ‘641 Patent (entitled “Automated Pixel Shifting within a Video File”) the example of a photo of a house with grass in front is used to illustrate.

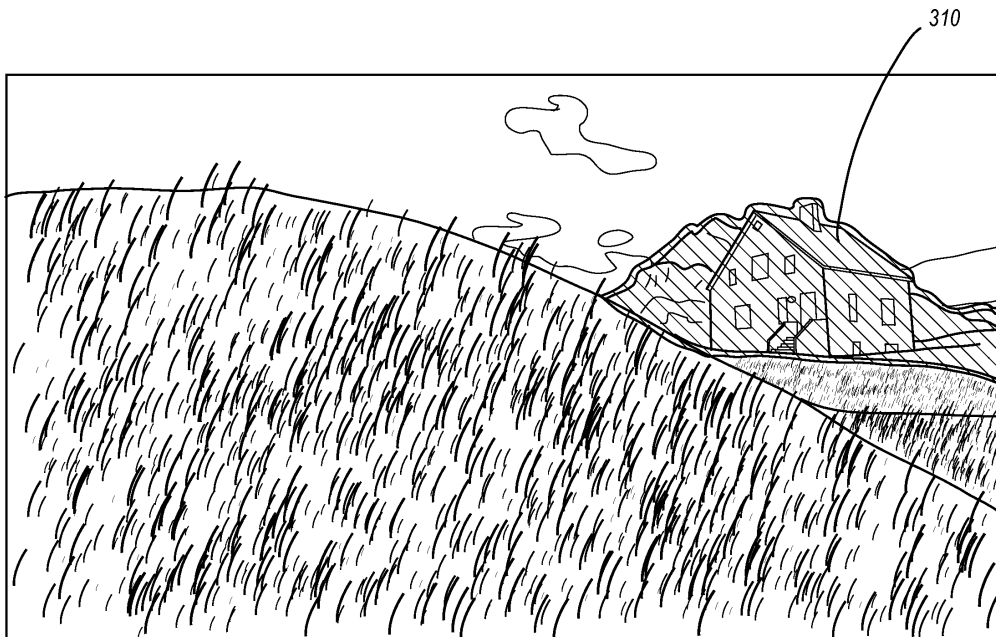
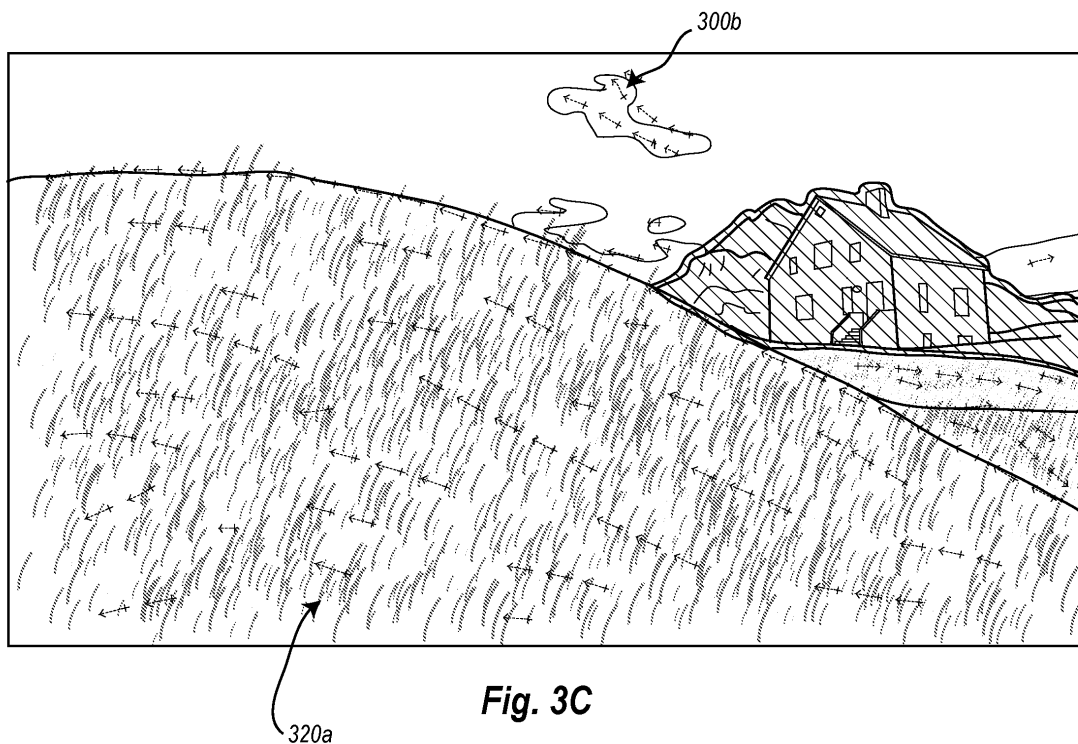


Fig. 3B

“FIG. 3B [of the ‘641 Patent] illustrates a mask 310 covering the house and the mountain behind the house, but excluding the sky and the grass in front of

the house.” (EX1001, col. 4, lines 61-63). “The mask prevents pixels covered by the mask from being shifted.” (*Id.*, col. 5, lines 18-20). The mask may be created using several techniques. In one, “the software architecture 200 performs an edge detection method to identify edges that form boundaries around the [user] selected area” (*Id.*, col. 4, lines 57-58). Alternatively, a user may use a manual mask painting option to create the mask. (*Id.*, col. 5, lines 29-32). In another embodiment, “stabilizer points are useable for creating a fence around an area that should not be shifted.” (*Id.*, col. 5, lines 35-37).

The patent specification then explains how digital links or paths having starting and ending points are used as tools which allow the computer to make the grass and sky in the photo appear to move.



First, a starting point for shifting of pixels is selected. A user can select starting points manually and/or “direct the software architecture 200 to automatically add a portion of the points” (*Id.*, col. 6, lines 14-15). “For example, in FIG. 3C, various beginning points (also referred to herein as “starting points”) comprise the points nearest to the base of the grass and represented by crosses. . . .” (*Id.*, col. 6, lines 40-43). Second, an ending point is selected.

The ending point is received through a user selection of an ending portion of the user interface. . . . For example, in FIG. 3C various ending points are selected on the outer periphery of the grass and are represented by arrows.

(*Id.*, col. 6, lines 48-56). Then, “. . . the software architecture creates a link between the starting point and first ending point.” (*Id.*, col. 6, lines 58-61). The links in FIG. 3C are the lines which extend between the crosses and arrows in the picture. “A link comprises a direction extending from the first starting point to the first ending point” (*Id.*, col. 6, lines 62-64).

The patent specification then describes selecting sets of pixels and illustrate the pixel shifting process which is carried out by the computer using the digital link(s).

FIG. 5A depicts the pixels 500, 510, 520 in their original state within the video frame. Once the software architecture 200

begins shifting the set of pixels in the direction of the link (extending from the starting point to the ending point) the pixels 500, 510, 520 are moved. . . . FIG. 5C depicts pixels 500, 510, 520 another step along the shift. In FIG. 5D the pixels 500, 510, 520 are shown at yet another step in the shift, but in this step the pixels 500, 510, 520 are beginning to loop around.

(*Id.*, col. 8, lines 1-56).

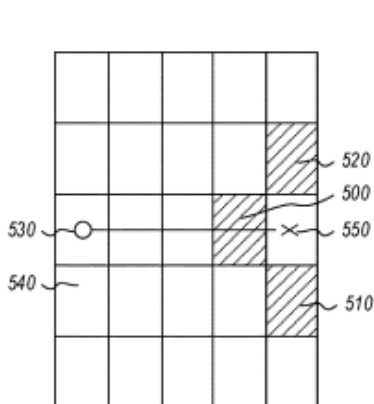


Fig. 5A

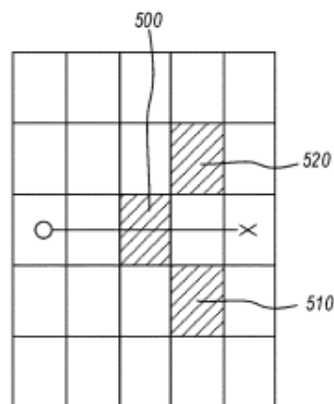


Fig. 5B

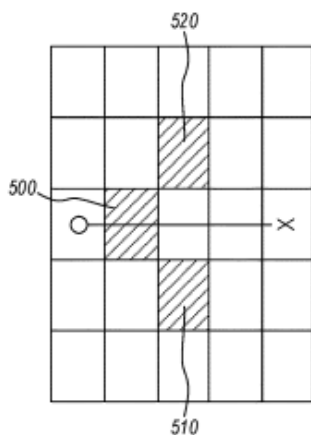


Fig. 5C

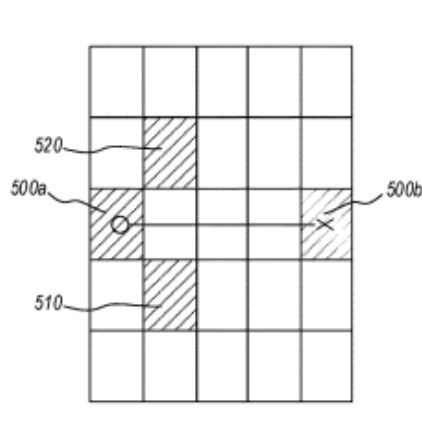


Fig. 5D

It can be seen from Figures 5A-5D that a set of three pixels, having been selected for shifting, is being shifted right to left. The specification is clear that the pixels wrap around and begin to appear at the starting point (550) as they are disappearing at the ending point (530).

FIG. 5C depicts pixels 500, 510, 520 another step along the shift. In FIG. 5D the pixels 500, 510, 520 are shown at yet another step along the shift, but in this step the pixels 500, 510, 520 are beginning to loop around. For example, pixel 500a is at the left of the shift, while corresponding pixel 500b is reappearing at the right of the shift to begin the shifting loop.

Id., col. 8, lines 53-59.

The specification also describes an alternative embodiment for shifting pixels in a loop.

For example, in at least one embodiment, the pixels immediately begin cycling as soon as the shifting begins. For example, instead of what is shown in FIGS. 5A-5D, as soon as pixel 500 is shifted to its new position depicted in FIG. 5B, pixel 500B would appear in the position depicted in FIG. 5D. As such, the pixels begin looping and blending into each other immediately.

Id., col. 9, lines 16-22.

2. Exemplary Claim

Claim 1 of the '641 Patent is reproduced here:

1. A computer system for providing, to a client computing device, software for automating a shifting of pixels within a video file, the computer system comprising:

one or more processors; and

one or more computer-readable media having stored thereon executable instructions that are transmitted to the client computing device for execution by one or more client processors on the client computing device, the executable instructions comprising instructions that when executed by the one or more client processors configure the client computing device to perform at least the following:

access, from memory, a digital image file, wherein the digital image file comprises information that corresponds to individual pixels within a frame of the digital image file;

receive a first starting point through a user interface, wherein the first starting point is received through a user selection of a first beginning portion of a first image frame;

receive a first ending point through a user interface, wherein the first ending point is received through a user selection of a first ending portion;

create a first digital link between the first starting point and the first ending point, wherein the first digital link comprises:

a first direction extending from the first starting point to the first ending point; and

a first length between the first starting point and the first ending point;

identify a first set of pixels that lie along the first link between the first starting point and the first ending point; and

shift the first set of pixels in the first direction.

(EX1001, claim 1).

B. The Cited Art

1. The AEM Reference

Ground 1 is the challenge to claims 1-4, 8-15 and 19-20 over the “AEM” reference. “AEM” is how Petitioner refers to the User Manual for the Adobe After Effects CS6 software program (AECS6”). Petitioner contends that AEM teaches a user to perform the “identify[ing]” of a “first set of pixels” between the starting and ending points to either be covered by a mask and thus excluded from the set of pixels to be shifted or, alternatively, by using software to identify “pixels between the starting and ending points that are or are not ‘covered by a mask.’” Petition at 28-29. Further, Petitioner contends that:

. . . as AEM teaches, AECS6 allows a user to apply either a mask or matte to select any or all pixels of the layer to be nontransparent and thus included in the layer’s mesh to be moved and animated, including pixels that lie along the Deform pin’s

motion path between the Deform pin's starting and ending positions/keyframes

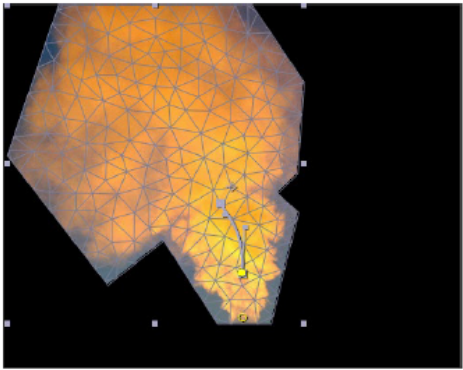
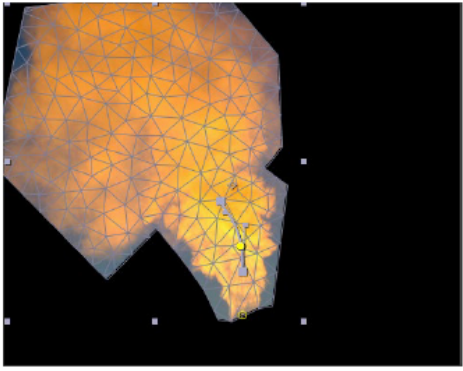
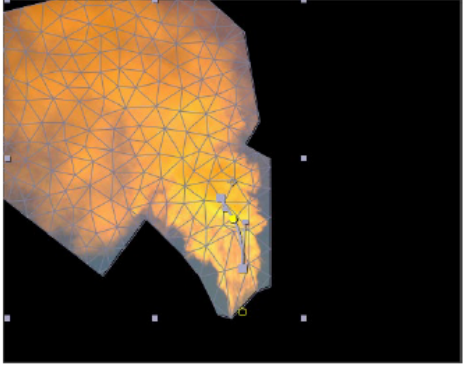
Id. at 29.

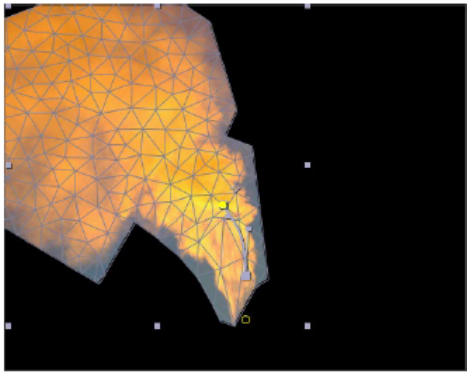
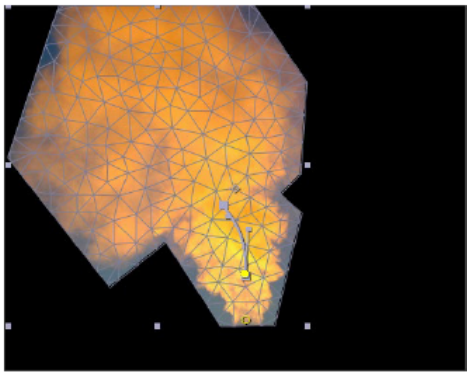
Petitioner also contends that AEM teaches a user to shift the set of pixels using “. . . a ‘mesh algorithm’ that ‘triangulates the mesh using defined points and then calculates an affine transformation for every angle.” Paper No. 1 at 32. Petitioner asserts that:

AEM similarly teaches that, when a user places an initial Deform pin, AECS6 creates a mesh from the layer's non-transparent pixels. AEM, 219, 220-21; Section VI.A.2.e; Greenspun, ¶123. And when a motion path for the Deform pin is also created, AECS6 animates the corresponding change to the shape of the layer's mesh (which includes the “first set of pixels,” *see* Section VI.A.2.f), and thus the movement of the layer's nontransparent pixels accommodating the Deform pin's repositioning

Id. at 33.

With regard to claim 8, Petitioner relies upon the testimony of Dr. Greenspun to purportedly demonstrate the use of Adobe After Effects to shift a set of pixels “in a loop.” The Petition notes that: “[t]he table below provides a series of cropped screenshots of AECS6 . . . where a “loopOut()” expression has been applied to each Deform pin” Petition at 36. Patent Owner reproduces the first five of these cropped screenshots below for illustration:

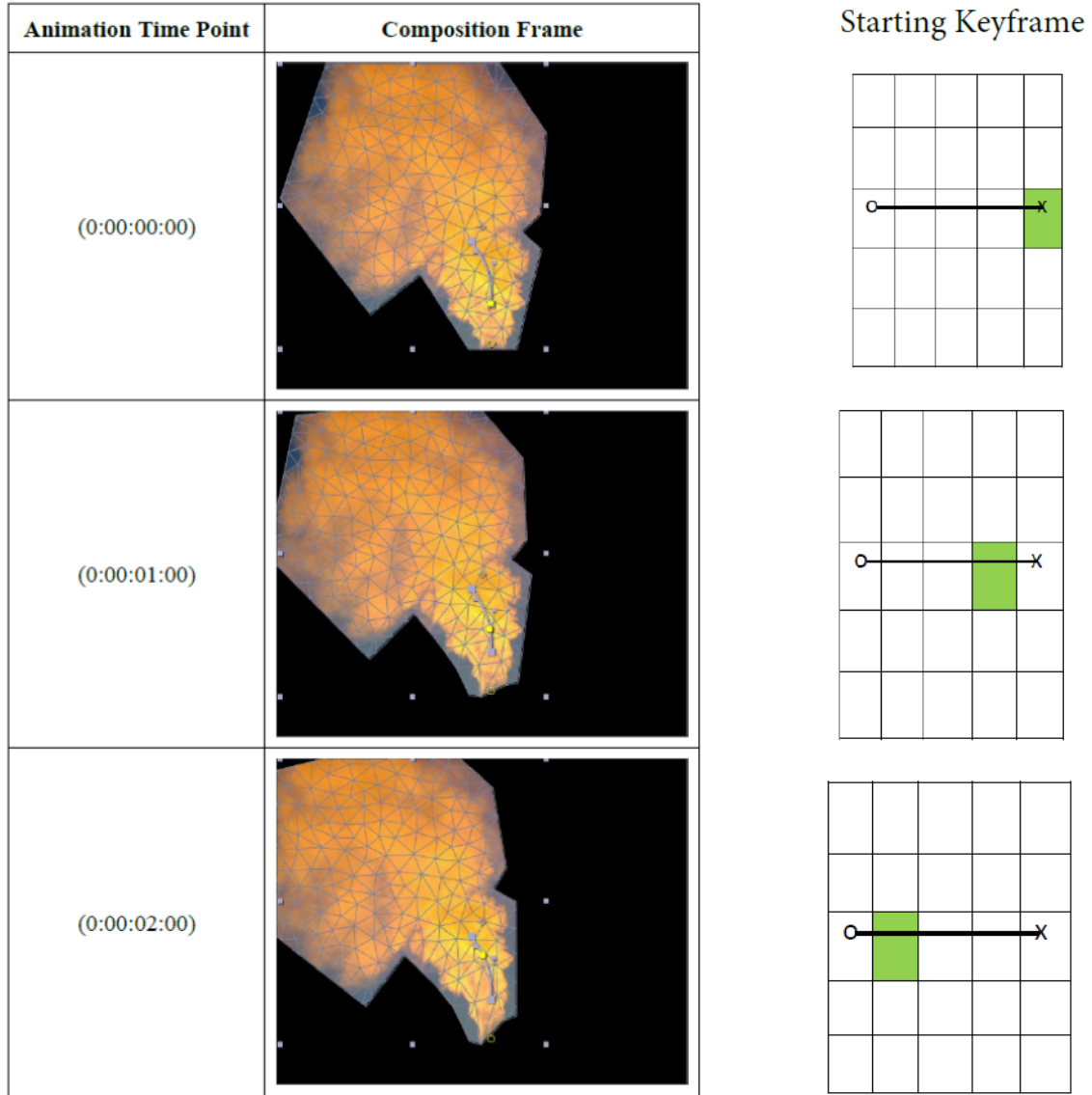
Animation Time Point	Composition Frame
(0:00:00:00)	
(0:00:01:00)	
(0:00:02:00)	

Animation Time Point	Composition Frame
(0:00:02:23)	
(0:00:03:01)	

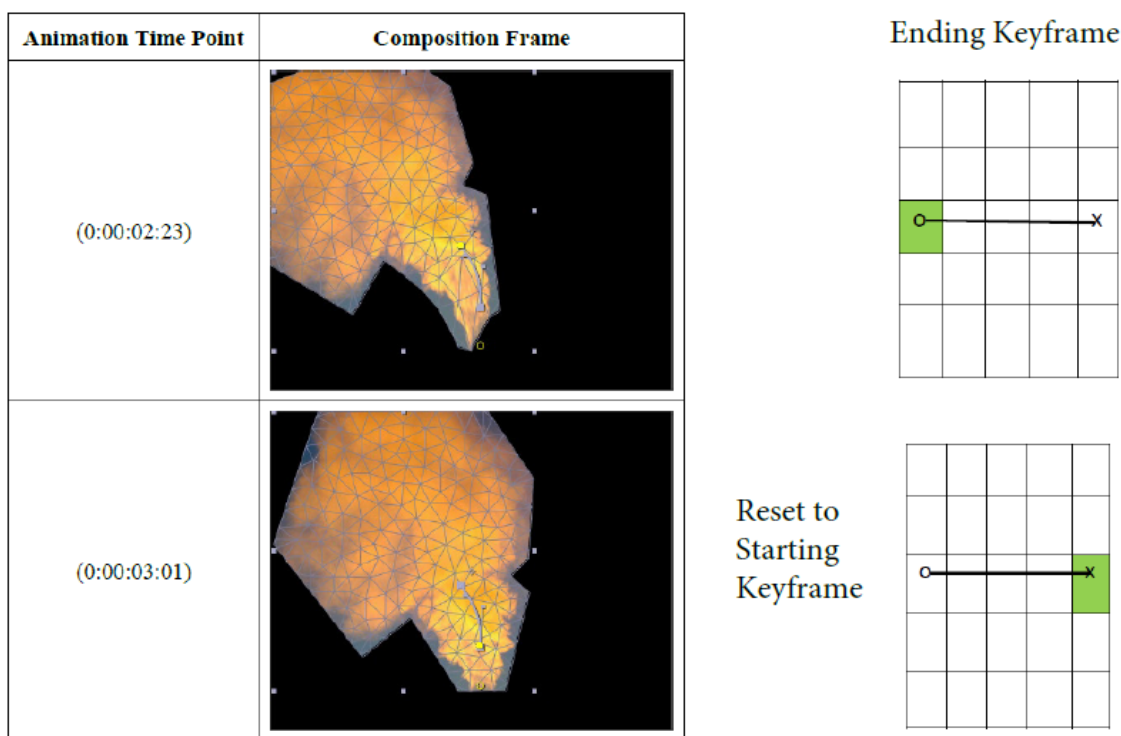
Paper No. 1 at 37-38. What you are looking at is a small yellow dot (i.e., the “Deform pin”) which is at a starting point of a grey path at the beginning of a shift at Animation Time Point (00:00). The Deform pin is shifted to intermediate points along the path at Animation Time Points (01:00) and (02:00). At Animation Time Point (02:23) the Deform pin has reached the ending point of the grey path. At Animation Time Point (03:01) the Deform pin has been returned to its starting point as the keyframes are reset to the beginning (see Paper No. 1 at 38).

Patent Owner submits that movement of a Deform pin using the AEM reference could be modeled using the 5x5 grid featured in Figure 5 of the ‘641

Patent, and it would appear as follows with a Deform pin being represented as a single green pixel¹:



¹ Dr. Greenspun's shifting of the Deform pin is indistinguishable from the shifting of a single pixel.



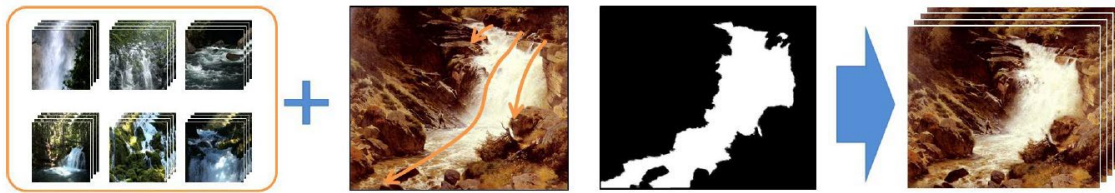
Petitioner is moving a pixel from a starting point (represented by the “x”) to an ending point (represented by the “o”) and then returning it to the starting point.

2. The IMU Reference

Grounds 2 and 3 of the Petition allege that the instruction manual for ImageMagick Usage (Version 6)(i.e., “IMU”), in combination with other references, renders claims 1-4, 8-15 and 19-20 obvious. IMU is a collection of Wayback Machine captures of the ImageMagick.com website which pertain to the ImageMagick Version 6 (“IMV6”) open-source image processing software.

3. The Okabe Reference

The Petition cites Okabe as teaching an algorithm that “generates a flow animation in the in the target image corresponding to the flow direction and speed specified by the user’s strokes, and permits ‘infinite repetition’ of such an animation.” Paper No. 1 at 62. Like AEM and IMU, this is a series of sequential frames, as illustrated by Okabe’s Figure 1:



Id. These sequential frames are animated by “infinite repetition.” However, this mischaracterizes what the “user’s strokes” actually do and ignores the fact that Okabe does not shift pixels in a still image.

In Okabe, a user “inputs a single target image and an alpha matte that extracts the fluid region of interest.” EX1009 at 3. A user can provide “a few optional suggestions about fluid motion, e.g., sketches of flow direction, shown as orange arrows.” *Id.* at 2. It is not apparent from Okabe that the orange arrows in Fig. 1 are “user-viewable” on a user interface as opposed to merely being illustrations added to the Okabe article by the author.

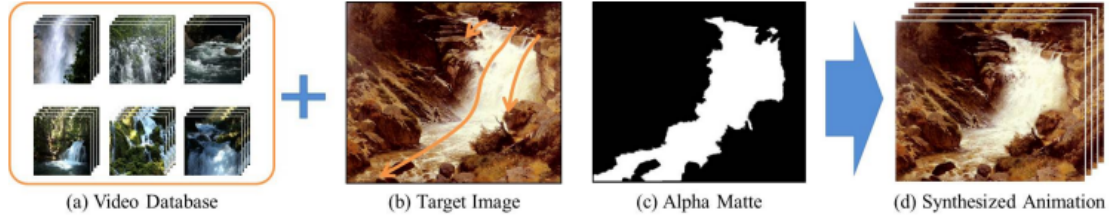


Figure 1: We employ a database of video examples of fluids (a). The user specifies a target image (b) with a few optional suggestions about fluid motion, e.g., sketches of flow direction, shown as orange arrows. The user also provides an alpha matte of the region of interest (c). The system synthesizes an animation (d).

Okabe then “employ[s] a video database that includes hundreds of video examples of fluids, which therefore helps the user to synthesize better quality animations” EX1009 at 1. Okabe “cut[s] each video example into smaller pieces (Fig. 2-c).” *Id.* at 3.

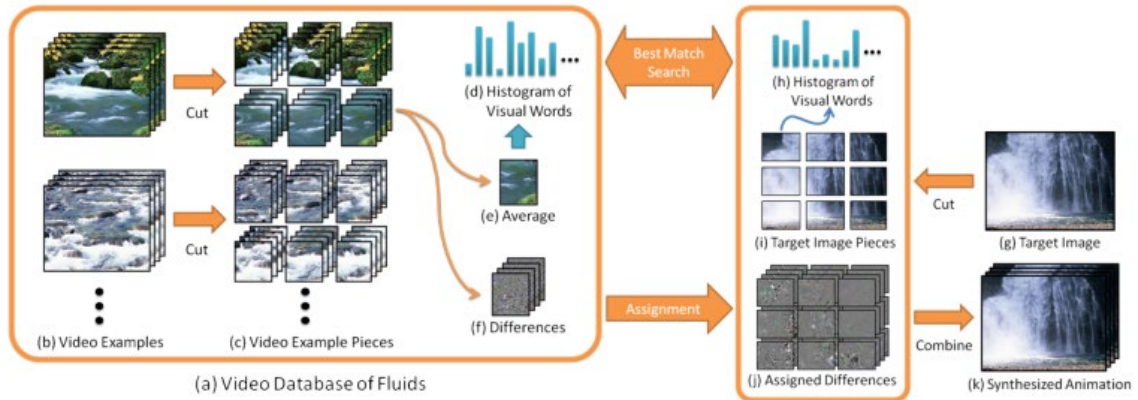


Figure 2: System overview.

These video examples are then patched on by “assigning them onto parts of the target image” *Id.* at 2. The video patches are selected by Okabe’s process for best match based upon appropriateness as determined by three criteria: appearance similarity, smoothness of motion fields, and appearance similarity between neighboring assigned pieces. See *Id.* at 5. When a user

“provide[s] a desired motion field by sketching the flow direction and painting a speed map, [this] is used as a constraint in the assignment process.” *Id.* at 3.

4. The Li Reference

Ground 3 of the Petition contends that claims 13-15 are obvious in view of IMU in combination with Okabe and Li. Paper No. 1 at 86. The Petition cites Li as teaching “[a] ‘Lazy Snapping’ [tool] . . . [that] allows a user to easily perform image cutout in two steps: ‘a quick *object marking* step (b) and a simple *boundary editing* step (c).” *Id.* Li has nothing to do with shifting a set of pixels.

C. Claim Construction

The scope of patent claims is determined giving claims their broadest reasonable construction consistent with the specification; the words of a claim are given their plain meaning unless the plain meaning is inconsistent with the patent specification as understood by a person of skill in the art at the time of the invention. “Even under the broadest reasonable construction rubric, however, the board must always ‘consider the claims in light of the specification and teachings in the underlying patent.’” *In re: Power*

Integrations, Inc., 884 F.3d 1370, 1375 (Fed. Cir. 2018) (citing *In re CSB-Sys. Int’l, Inc.*, 832 F.3d 1335, 1341 (Fed. Cir. 2016)). The patent specification “is the single best guide to the meaning of a disputed term” in a claim. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005)(en banc).

D. Legal Standards

Petitioner has the burden to show that it is likely to prevail as to at least one claim of the ‘641 Patent. 35 U.S.C. §314. The Board may decline to institute the petition as to any claim that the Board determines that Petitioner has not shown it is likely to prevail on. *SAS Institute, Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1352 (2016); *Synopsys, Inc. v. Mentor Graphics Corp.*, 814 F.3d 1309, 1316-17 (2016). “[P]etitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech, Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). This burden never shifts to the Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Petitioner has the burden of proving that the prior art it relies upon shows every element of the challenged claims. “[A] prior art reference must provide every element of the claimed invention arranged as in the claims in order to anticipate.” *Microsoft Corp. v. Biscotti, Inc.*, 878 F.3d 1052, 1069

(Fed. Cir. 2017). Also, if a single element of a claim is absent from the prior art, the claim cannot be considered obvious. *See CFMT, Inc. v. YieldUp Int'l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (“Obviousness requires a suggestion of all limitations in a claim.”).

E. Petitioner Fails to Invalidate Any Claim of the ‘641 Patent

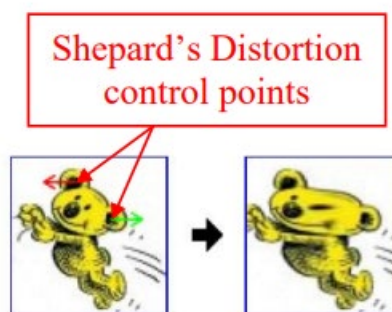
The references asserted by Petitioner do not teach or suggest all the elements of the independent claims of the ‘641 Patent. The cited art fails to teach or suggest receiving starting or ending points or creating a digital link. Petitioner’s cited art does not select or identify a first set of pixels which lie along or are along a digital link between a starting and ending point, as required by every challenged claim. Petitioner’s references also do not shift a first set of pixels along the digital link. Also, the references do not teach or suggest shifting a set of pixels “in a loop” as claim 8 recites or a mask which prevents pixels from shifting as claim 13 recites.

Patent Owner notes that a number of the challenged claims require additional steps or elements which are also not taught or suggested by the Petitioner’s cited art. An example is claim 9 which recites “identify[ing] a second set of pixels” and “shifting the second set of pixels in the second direction.”

1. The prior art does not teach or suggest receiving starting or ending points through a user interface

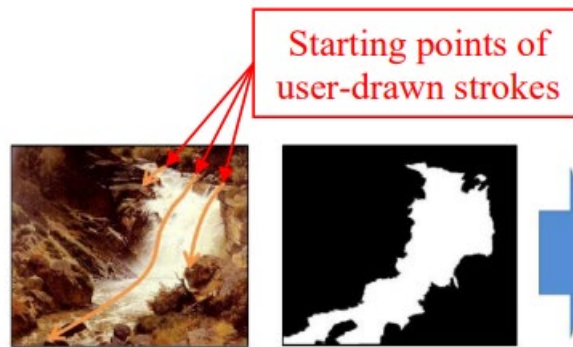
Each of the independent claims (1, 12, 19) recite elements in which a first starting point (elements 1b, 12a, 19b) is received through a user interface. These elements are not taught or suggested by any of the cited art. For AEM, there is no starting point received through the user interface. What is shown at Animation Time Point (0:00:00:00) [Paper 1 at 34] is merely the initial position of a Deform pin before it is moved. It is not the starting point for the shifting of any set of pixels or any other pixels aside from the Deform pin.

In IMU, no starting point is received through the user interface. What is shown in the Petition at p. 71 is merely the initial position(s) of two control points before they are moved in opposite directions. These control points are not shown to be the starting points for the shifting of any set(s) of pixels or other pixels aside from the control points.



Paper 1 at 71.

Okabe also does not show receiving a starting point through a user interface at all. The Petition points to the beginning portions of Okabe's orange arrows as being the received starting points.

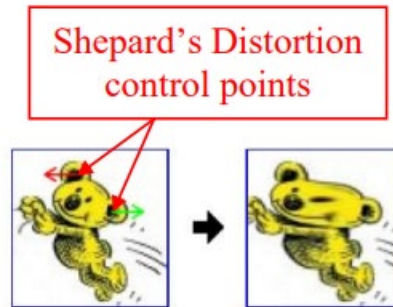


Paper 1 at 72. But these points have not been shown to be the starting points for anything. Okabe's orange arrows are merely optional suggestions about fluid motion. They are not pathways along which pixels are ever shifted and, therefore, the beginnings of such arrows do not function as starting points for any pathways of shifting. *See* IPR2023-00152, Paper 7 at 22 (“... Okabe's strokes merely provide a general indication of the desired direction of movement – there is no indication that they define pathways that pixels are shifted along.”).

Independent claims 1 and 19 also recite elements in which first ending points are received through a user interface (elements 1c, 19c). Patent Owner submits that these elements are not taught or suggested by the cited art for the same reasons that the starting points are not. For the AEM reference, there is

no ending point received through the user interface because what is shown at Animation Time Point (0:00:02:23) [Paper 1 at 38] is merely the ending position of the Deform pin and not the ending point for the shift of any set of pixels.

In IMU, no ending point is received through a user interface. What is shown in the Petition with the koala image (right side) is merely the final positions of two control points after they are moved.



Paper 1 at 71.

Okabe does not show receiving an ending point through a user interface either. The Petition points to the arrowheads of Okabe's orange arrows as being received ending points. Paper 1 at 73. But because the orange arrows do not function as pathways along which pixels are shifted, the arrowheads do not serve as ending points for any such shift.

2. The prior art does not teach or suggest creating a digital link

Independent claims 1 and 19 require (elements 1d, 19d) “creat[ing] a first digital link between the first starting point and the first ending point.” Claim 12 requires “creating a first digital link extending in the first direction from the first starting point” (element 12c). Claim 9 requires “creat[ing] a second digital link between the second starting point and the second ending point” (element 9c).

The prior art does not teach or suggest these steps. Because starting points and ending points for shifting of pixels are not ever received through the user interface, as noted above, no digital link between such points is created.

3. The prior art does not teach or suggest the step of identifying or selecting a first/second set of pixels

Independent claims 1 and 19 require that a client computing device “identify a first set of pixels that lie along the first digital link between the first starting point and the first ending point.” Claim 9 recites “identify[ing] a second set of pixels that lie between the second starting point and the second ending point” (element 9d). Independent claim 12 recites a method including the step of: “selecting a first set of pixels that are along the first digital link and extend in the first direction away from the first starting point.” The cited

art fails to teach selecting or identifying a first or a second set of pixels that lie along or are along the digital link.

The '641 Patent specification illustrates a set of pixels (500, 510, 520) in which two of the pixels (510, 520) are at the starting point (550) and pixel 500. This set of pixels lies along the digital link that extends between the starting point 550 and the ending point 530.

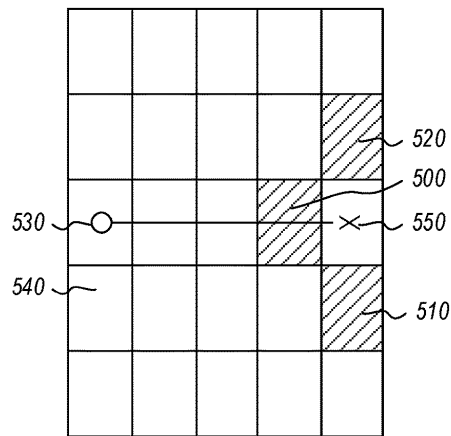
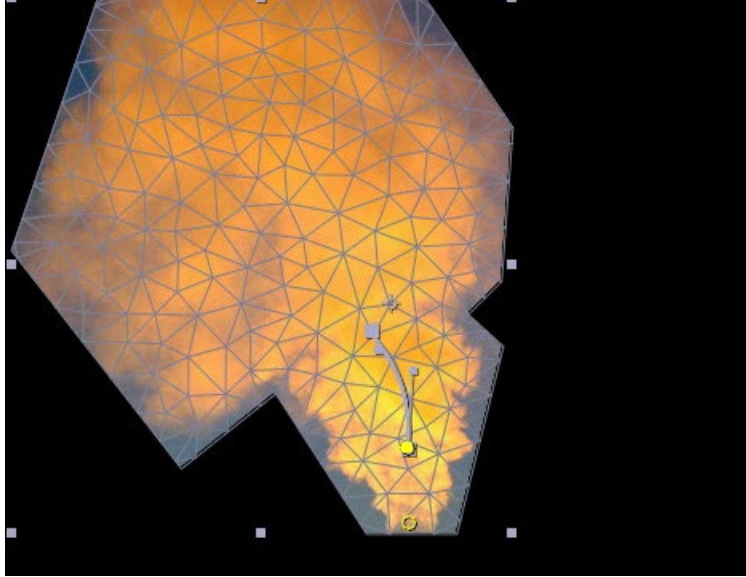


Fig. 5A

Petitioner does not select a set of pixels that meets any of these claim requirements. Petitioner only selects a Deform pin.



Petition at 34. This is essentially a single pixel which is located at the starting point of the shift in the same manner that pixels 510, 520 are in Figure 5. There are no pixels which, as claim 12 recites, lie along the digital link (i.e., grey path) between starting and ending point. The Deform pin is merely the pixel which is at the first starting point.

AEM fails to teach selecting or identifying a set of pixels as the claims require that lie along or are along a digital link. AEM selects certain pixels to be transparent or nontransparent relating to “compositing,” i.e., creating a composite image from multiple images. EX1003, 315-316. AEM states: “To create a composite from multiple images, you can make parts of one or more of the images transparent so that other images can show through.” *Id.* at 315. Therefore, each pixel in the composite image is either transparent or nontransparent such that every pixel is “selected” under Petitioner’s usage of

the term “selecting.” The possibility that some of these pixels, in theory, could extend along a digital link between a starting point and an ending point would be mere happenstance. Petitioner doesn’t point to any disclosure in AEM for actually selecting a set of pixels (either transparent or nontransparent) that extend along a digital link between a starting point and an ending point. See *Id.* AEM’s disclosure of designating pixels as transparent or non-transparent does not meet the requirement of showing of “identifying” or “selecting” a set of pixels that lie along or are along a digital link.

The other cited prior art also fails to teach or suggest selecting a first set of pixels that lie along or are along a digital link between a first starting point and first ending point. Petitioner’s asserted Ground 2 relies upon an IMU-Okabe combination. Petitioner argues that because this combination would allow a user to apply a matte specifying a region of interest in an image the user desires to animate and a stroke specifying the direction and speed of a Shepard’s Distortion control point across the animation, “a user would have been allowed to select any or all pixels of the image to be included in this region of interest, including pixels that lie along the stroke between the stroke’s starting and ending points . . .” Paper No. 1 at 74. Patent Owner submits that selecting “any or all pixels of the image” is not sufficient to disclose the claim elements of selecting or identifying a first set of pixels that

lie along or are along a digital link between the first starting and ending points. Only a single pixel that is shifted is ever selected with a control point of IMU. Combination of IMU with Okabe does not serve to teach selection of multiple pixels to shift. This is because, as will be explained shortly, no pixels that Okabe selects are ever shifted.

4. The prior art does not teach or suggest the step of shifting a first/second set of pixels in the first/second direction

Each of the claims requires that the selected first set of pixels be shifted in a first direction [i.e., away from the first starting point]. Specifically, independent claims 1 and 19 recite the step of “shift the first set of pixels in the first direction.” Independent claim 12 recites a method which includes the step of “shifting the first set of pixels, in the first image frame, in the first direction.” Claim 9 recites the step of “shift[ing] the second set of pixels in the second direction.” (element 9e). The cited art fails to teach or suggest these steps.

Petitioner’s argument that AEM discloses these elements is that “[w]hen a motion path for the Deform pin is also created, AECS6 animates the corresponding change to the shape of the layer’s mesh (which includes the ‘first set of pixels,’ *see* Section VI.A.2.f), and thus, the movement of the layer’s nontransparent pixels accommodating the Deform pin’s repositioning

...” Petition at 33. This argument does not establish that a first set of pixels is shifted in the first direction as claimed. Rather, AEM discloses creating a mesh by placing Deform pins wherein the mesh changes shape in response to moving one or more of the Deform pins. *See* IPR2023-00152, Paper No. 7 at 14. AEM does not disclose how any pixels of the mesh move in response to the Deform pin being moved. Therefore, it fails to teach that any set of pixels moves along the pin’s motion path. Neither the Petition nor Dr. Greenspun’s Declaration adequately explains how any of the sample AECS6’s screenshots demonstrate that any pixel other than the pixel corresponding to the Deform pin moves along the motion path. *Id.* at 15.

The proposed IMU-Okabe combination also does not teach or suggest the shifting elements. Petitioner argues that the ‘641 patent states that the claimed shifting can be performed using “a warping function, such as Shepard’s distortion,” and that “IMU explicitly teaches that IMV6 performs “Shepard’s Distortion” and, therefore, the claimed pixel shifting.” Petition at 75 (citing Exhibit 1001, col. 9, lines 27-29). The ‘641 patent actually discloses that “software architecture 200 uses alpha blending when shifting the pixels from the starting point to the ending point,” and “[a]dditionally, in at least one embodiment, the software architecture uses a warping function, such as Shepard’s distortion.” EX1001, col. 9, lines 23-29.

The asserted IMU-Okabe combination fails to teach the shifting steps of the claims because no pixels within the region of interest selected with Okabe's "matte" would be shifted given the teachings of the art. As noted previously, Okabe synthesizes fluid flow animation on a target image using a database of video examples of fluid flow. The database provides video examples of flow, and Okabe then cuts up selected video examples "into small pieces." EX1009 at 3. Instead of shifting pixels within the target image, sections of the selected pixels are replaced or patched over with the small pieces of video. See EX1009 at 3 ("Next we . . . assign video example pieces that have appearances similar to target image pieces."). No pixels within the area selected by the matte are ever shifted with Okabe. Motion that occurs in the final synthesis is provided by the video patches rather than any pixels that are shifted.

Patent Owner submits that one of skill in the art reading Okabe would not be motivated to use IMU's Shepard's Distortion at all given the teachings of Okabe. Because the pixels in Okabe's selected region are being patched over with video pieces, there is no utility in using Shepard's Distortion to 'animate' them. Further, the video pieces provide the animation themselves, and using Shepard's Distortion (to the extent it could be applied to a video

piece) would defeat the purpose of the provided video example pieces/patches.

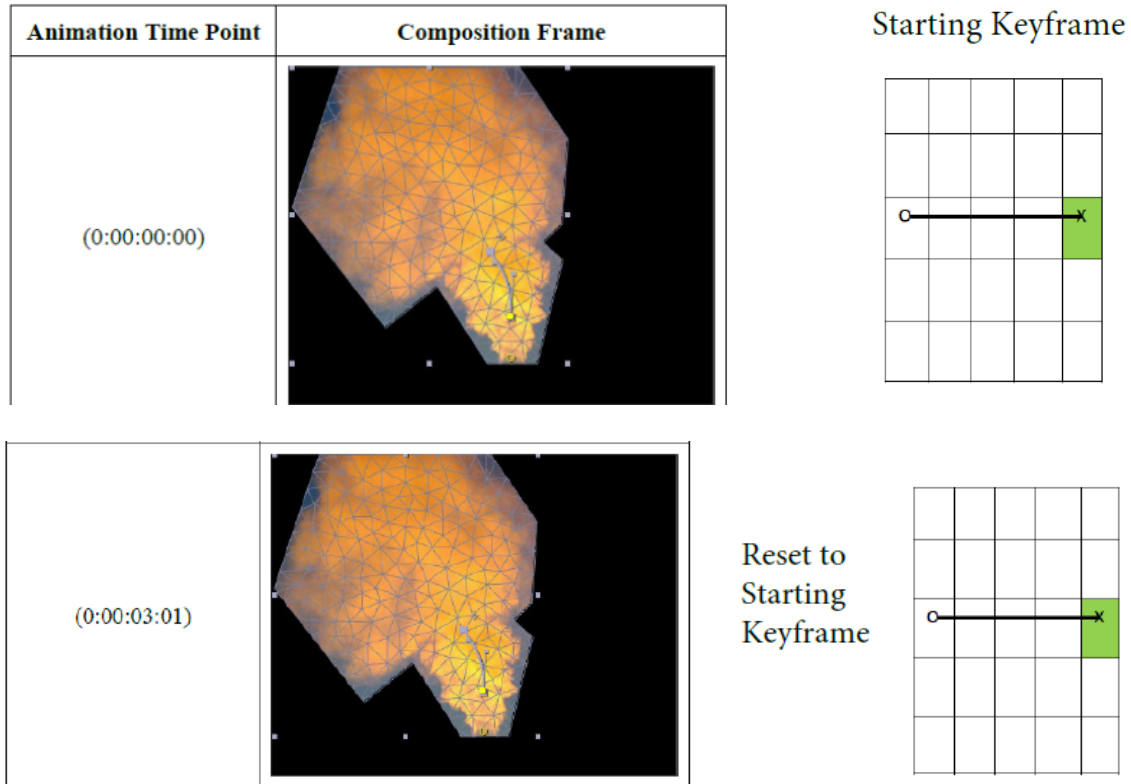
Additionally, Okabe teaches away from pixel-based shifting approach to teach a patch-based method. Okabe notes that “[o]ur method differs from Image Analogies in that it is not pixel-based but rather is a patch-based texture synthesis, similar to Image Quilting.” *Id.* at 3. One reading Okabe would not look to a pixel-based shifting mechanism such as Shepard’s Distortion in view of this distinction. Even if one were to combine IMU with Okabe the combination fails to teach or suggest selecting a set of pixels and then shifting that set of pixels. IMU selects and shifts single pixels only with control points. Okabe, at best, selects a set of pixels but then shifts none of them.

Because the art fails to teach or suggest shifting a set of pixels in a first direction, this applies as well to claim elements with respect to a second direction (i.e., element 9d).

5. The prior art does not teach or suggest shifting a set of pixels by rendering them “in a loop”

Challenged claim 8 of the ‘641 patent recites that “shifting the first set of pixels comprises rendering in a loop the first set of pixels being shifted within the first image frame.”

AEM does not teach or suggest shifting of any pixels by rendering in a loop because no pixel ever loops around any other pixels during shifting. Merely returning the Deform pin back to its starting point is not shifting it “in a loop.” Consider where the Deform pin starts and where it finishes:



Paper No. 1 at 34-35 (annotated). The Deform pin starts and ends up in the same position. But now consider where the leading pixel 500 starts (Fig. 5A) and where it ends up (Fig. 5D) after being shifted “in a loop” per the ‘641 Patent:

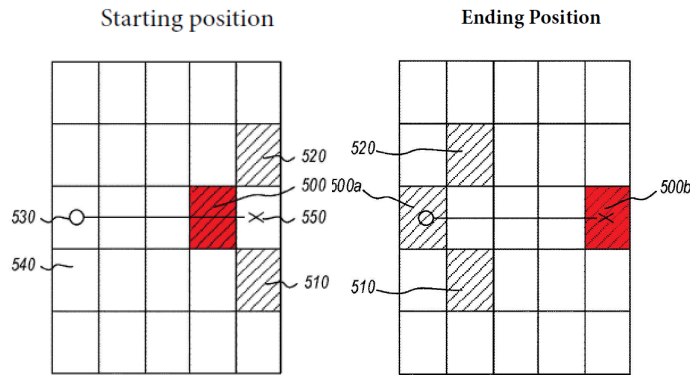


Fig. 5A

Fig. 5D

The pixel ends up one space behind (i.e., to the right of) where it started out. Also consider the starting and ending positions for the leading pixel 500 in the alternative embodiment described in the '641 Patent at col. 9, lines 16-22 and which is illustrated here:

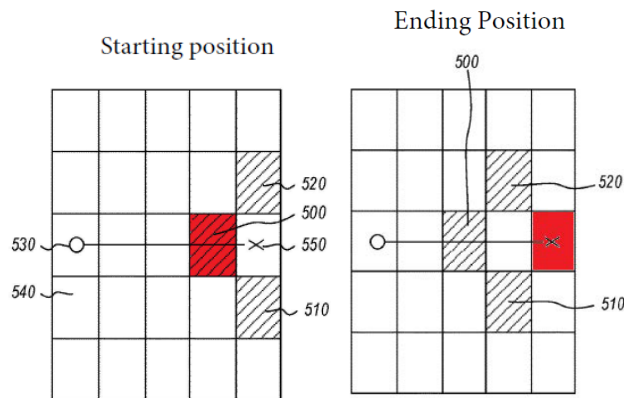


Fig. 5A

Fig. 5B

They are the same as for the first embodiment. The pixel being looped ends up behind (to the right of) where it started out. That is why merely returning a pixel to its starting point is not shifting it in a loop. *See also* IPR2023-00152,

Paper No. 7 at 16 (“. . . we agree with Patent Owner that ‘[m]erely returning the Deform pin back to its starting [point] is not shifting it ‘in a loop.’”).

The Petition fails to teach or suggest the shifting in a loop element for other reasons as well. The Petition does not explain how the Dr. Greenspun’s screenshots (Paper No. 1 at 37-38) demonstrate that any pixel other than the pixel corresponding to the Deform pin moves along the motion path. And Petitioner seems to be equating looping a segment of time with shifting a set of pixels in a loop. AEM discloses that the loopOut expression “[l]oops a segment of time that is measured from the last keyframe on the layer back toward the In point of the layer” and that “[t]he loop plays until the Out point of the layer.” EX1003 at 562. It is not clear how looping a segment of time is the same thing as shifting a set of pixels in a loop. Also, there is not a sufficient explanation of the In point and Out point of the layer, and no disclosure that suggests applying the loopOut expression to a Deform pin. *See* IPR2023-00569, Paper No. 8 at 17 (discussing shifting in a loop element).

6. The prior art does not teach or suggest generating a mask wherein pixels under the mask are prevented from shifting

Claim 13 recites “receiving an indication to generate a first mask over a second portion of the first image frame, wherein pixels under the first mask are prevented from shifting.” However, this feature is not taught or suggested

by the cited art. With regard to AEM, the Petition points to a ‘mask’ created by an “Auto-trace” function to allegedly exclude “pixels of the layer . . . from the mesh by the mask. . . .” Paper 1 at 49. Similarly, the Petition alleges that “. . . a matte created using the ‘Roto Brush’ tool . . . indicat[es] pixels of the layer excluded from the mesh by the matte” *Id.* at 50. The Petition asserts that “naturally” these pixels are “excluded from the layer’s mesh so as to **not** be moved and animated” *Id.* at 53. However, there is no evidence at all provided to show that any pixels outside of the mesh are prevented from shifting as the claim requires.

The alleged IMU-Okabe combination also does not teach or suggest this element. The Petition alleges that “the IMU-Okabe Combination’s user applies a matte specifying a region of interest the user desires to animate. . .” and that “Naturally, the matte also specifies a region that includes pixels the user does not desire to animate.” Paper 1 at 83. However, there is no proof at all that any of the pixels excluded from the “matte” are prevented from shifting, as the claim requires. There is no reasoning provided as to why it would be “natural” that pixels outside of the matte are prevented from shifting, and no mechanism is described for preventing shifting. Therefore, this element is entirely missing from the Okabe reference.

The addition of the Li reference in Ground 3 is does nothing to reveal the claimed subject matter. No portion of Li states that any pixels, selected or not, are prevented from shifting. Li's Lazy Snapping tool is used to cut out portions of images and not to mask any portions to prevent shifting.

III. Conclusion

Petitioner has not invalidated any challenged claim of the '641 Patent. The prior art fails to teach or suggest receiving starting or ending points or the creation of a digital link between a starting and ending point. It also fails to teach or suggest shifting that first set of pixels in a first direction. The prior art Petitioner relies upon does not shift a set of pixels "in a loop" per claim 8 of the '641 Patent. The art also fails to teach or suggest a mask which prevents pixels from shifting, per claim 13.

Dated this 22nd day of December, 2023.

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e) the undersigned certifies that on December 22, 2023, the foregoing PATENT OWNERS PLOTAGRAP, INC. AND SASCHA CONNELLY'S RESPONSE UNDER 37 C.F.R. §42.107 was served via electronic mail upon the following counsel of record for the Petitioner:

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CERTIFICATE OF WORD COUNT

The foregoing PATENT OWNERS PLOTAGRAPH, INC. AND SASCHA CONNELLY'S RESPONSE UNDER 37 C.F.R. §42.107 complies with the type-volume limitations of 37 C.F.R. §42.24(b)(2). Excluding the items listed in 37 C.F.R. 42.24(a)(1) as not included in the word count, and using the word count of the word-processing system used to prepare the paper (Microsoft Word), the Response contains 6079 words.

/s/ Shawn Hunter
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