

Judicial Symposium on Intellectual Property/TOKYO 2019

Third day (September 27th), Case of the Panel Discussion

The following is a case example prepared based on an actual case that went before the Intellectual Property High Court after a decision was rendered by the Trial and Appeal Department (TAD) of the Japan Patent Office.

We assume that the claimed invention below is patented for today's discussion. The inventive step of the Patented Invention is disputed.

1. The Patented Invention

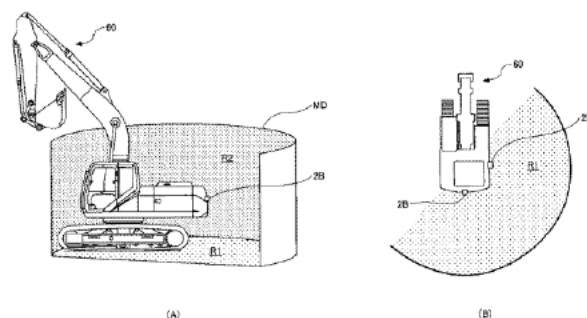
(1) Claim 1 reads as follows:

An excavator comprising:
an upper turning body;
cameras mounted on three portions of a left side, a right side, and a rear side of the upper turning body so as to capture images in three directions from the upper turning body;
a controller that generates an output image from captured images of the cameras;
a cab mounted on the upper turning body; and
a display device installed in the cab, wherein
the cameras are arranged to have an overlapping area of image ranges between neighboring cameras, with such overlapping areas being formed in two directions of left rear and right rear of the upper turning body,
the controller synthesizes captured images from neighboring cameras to generate an output image portion corresponding to the overlapping area, and
on the display device, the output image is displayed including the output image portions corresponding to the overlapping areas formed in the two directions.

(2) Summary of the Detailed Description of the Specification with respect to the Patented Invention

A (Prior art problem)

"The driving support system of prior art ... is not envisaged for use in a construction machine that performs turning and excavation operations. When an output image is shown in the cab of the excavator, visibility cannot be improved. It is desirable to improve the visibility of an output image that is generated based on a plurality of input images captured by cameras."



[FIG 3]

B (Problem to be solved)

"Since overlapping areas are captured with differing brightness due to different illumination conditions for each camera, luminance is different between cameras. Although the same place is captured, the luminance changes rapidly at the boundary between an output image based on input from the left side camera 2L and that based on input from the rear side camera 2B (see the area R6 surrounded by a dashed line in FIG. 16(A)), and therefore the operator who sees such output image may have an impression of unnaturalness or feel uncomfortable."

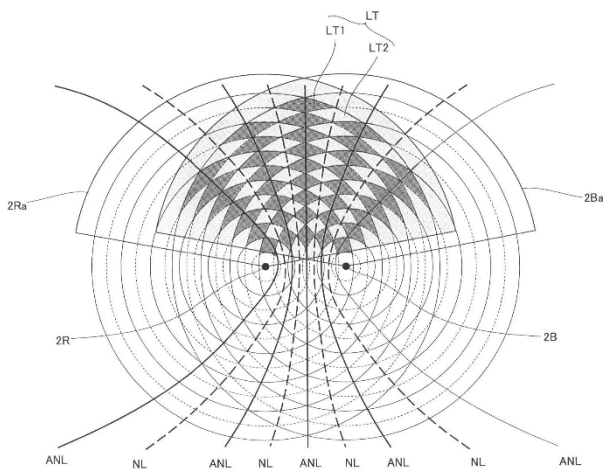
C (Function)

"FIGs. 13 and 14 show diagrams for explaining an example of generating bright and dark patterns that bring about 'the same color illusion' (an optical illusion in which identical shades of gray in a checker pattern appear to be different), and include two wave sources (e.g., the right side camera 2R and the rear side camera 2B. In FIGs. 13 and 14, a plurality of unit pattern areas LTs appear

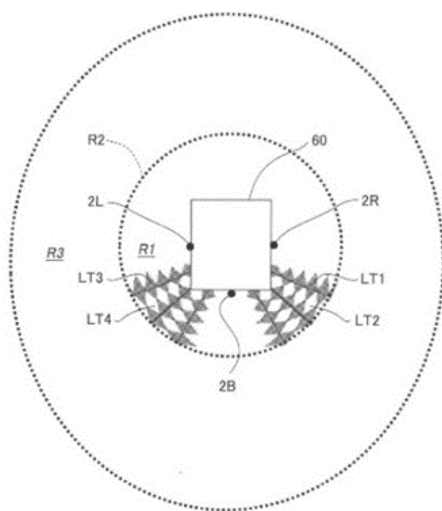
on the flat output image. If we assume that a unit pattern area LT1 corresponds to an input image from the rear side camera 2B, and a unit pattern area LT2 corresponds to an input image from the right side camera 2R, two input images with different average luminance form a lattice pattern will bring about ‘the same color illusion.’”

D (Technical Effect)

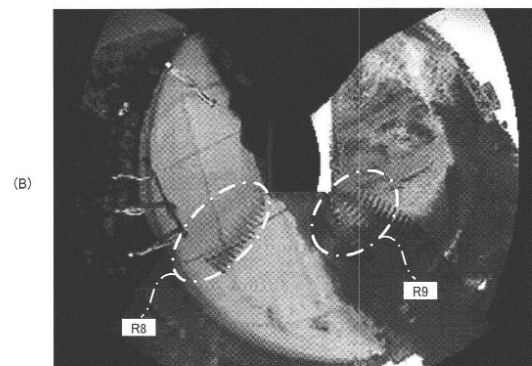
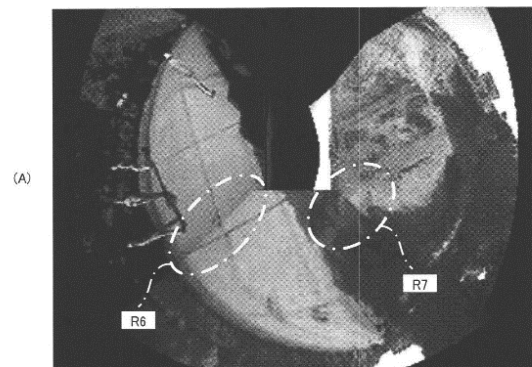
“In FIG. 16(B), the differences in luminance in areas R8 and R9 surrounded by a dashed line now become less noticeable because they are covered by lattice patterns. The operator who looks at the output image including areas R8 and R9 feels the image more natural and hence less uncomfortable.”



[FIG 13]



[FIG 14]



[FIG 16]

2. JP 2010-204821 A (Document 1)

(1) Cited Invention 1 found in Document 1

A hydraulic excavator comprising:

an upper turning body;

cameras respectively mounted at three portions of the right side, rear side and left side of the upper turning body so as to capture images in three directions of the right side, rear side and left side of the upper turning body;

an image processor for generating a display image from image signals of the cameras;

a cab provided on the upper turning body; and

a display device provided in the cab, wherein

the cameras are arranged in such a way that there exist overlapping areas between the monitoring ranges of the neighboring right side and rear side cameras, and between those of the neighboring rear side and left side cameras,

with the front direction of a simulated working machine being set in an upper image direction, the image processor generates a display image by arranging a right side image on the right side of the simulated working machine, a rear side image on the lower side, and a left side image on the left side, and synthesizing the images, and

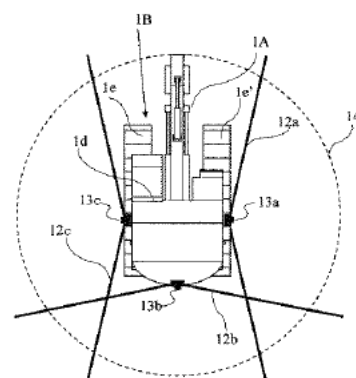
the synthesized display image is displayed on the display device.”

(2) Excerpts from Document 1, which is cited against the Patented Invention

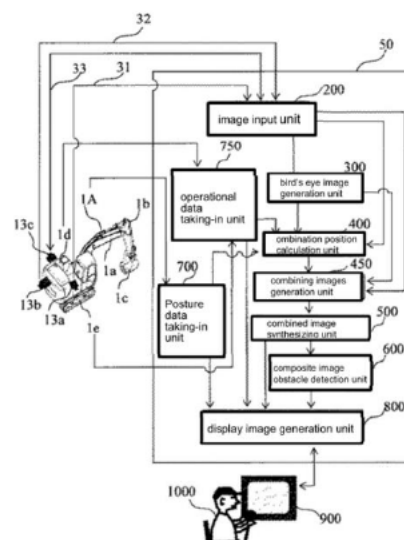
E “According to the present invention, it is possible to generate a combined image which does not bring about strange impression by combining, at the optimum positions, a bird's-eye image from a viewpoint above the working machine and camera images captured by cameras photographing the periphery.”

F “Camera 13a captures scene 12a, and transmits image signal 31 to the image processor 50. The image processor 50 inputs image signal 31 and stores it in the image input unit 200. Then, camera 13b captures scene 12b, and transmits image signal 32 to the image processor 50. The image processor 50 inputs image signal 32 and stores it in the image input unit 200. Then camera 13c captures scene 12c, and transmits image signal 33 to the image processor 50. The image processor 50 inputs image signal 33 and stores it in the image input unit 200. Image signals 31, 32 and 33 are converted into a bird's-eye image 300. The generation of the bird's-eye image 300 can be realized by a publicly-known art (e.g., see JP 2006-48451 A).”

G “As can be seen in FIG. 9, the bird's-eye image generation unit 300 converts input image 200a from the rear camera 13b into bird's-eye image 300a. At that time, the image of person 20b, who is captured by the rear side camera 13b, is converted together with a background scene and the head or upper body of the person 20b is also reshaped to become bigger at a distance from the camera in the bird's-eye image, and therefore person 20b will look quite strange. Accordingly, bird's-eye image 300b is clipped in a range between the camera and the combination position 454 while image 200b of the input image 200a is clipped in a range further than combination position 454. Then, image 300b



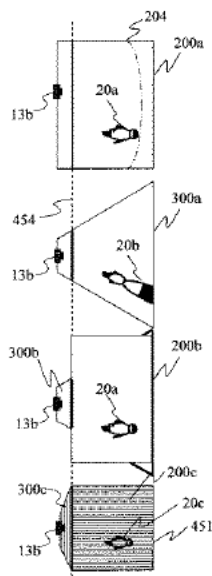
[FIG 2]



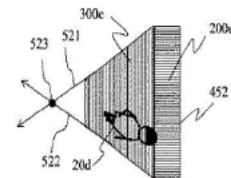
[FIG 3]

and image 200b are combined. However, if images 300b and 200b are combined directly, their sizes do not fit. Hence, the combination position between images 300b and 200b needs to be adjusted in order to make them fit. Then, image 300b needs to be resized in order to generate image 300c, and image 200b is resized in order to generate image 200c. Then, they are combined to generate combined image 451. Hence, the resized person 20b turns into person 20c in the resized image 200c.

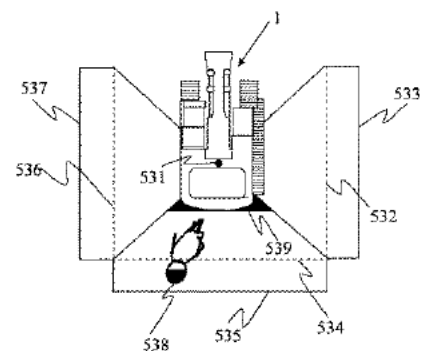
H “FIG. 16 shows a case in which combination positions in the synthesized image generated by the combining images synthesizing unit 500 are set away from the cameras. With respect to the right side input image, the intersection point 523 (see FIG.15) of combined image 533 (the intersection point of triangular side lines of image 533) combined at combination line 532 calculated by the combination position calculation unit 400 is placed on the center 531 of a simulated working machine 1 seen from above. Next, with respect to the rear input image, the intersection point 523 of combined image 535 combined at combination line 534 calculated by the combination position calculation unit 400 is also placed on the center 531 of the simulated working machine 1 seen from above. Also, for the left side input image, the intersection point 523 of combined image 537 combined at combination line 536 calculated by the combination position calculation unit 400 is further placed on the center 531 of the simulated working machine 1 as seen from above. Here, the head of the person 20 appearing in the rear image is seen as in the input image and not as a part of image skewed from the input image for preparing the bird’s eye image.”



[FIG 9]



[FIG 15]



[FIG 16]

3. JP 2006-48451 A (Document 2)

(1) Statements in Document 2

I “The image-synthesis section 62 processes, as necessary, the overlapped areas during the process of integrating the image-data signals Sd into a single image. That is to say ... , a plurality of image-data signals Sd for the same area are appropriately blended ... Thus, ... one bird’s-eye view image is obtained in a duplicated image area 67 ...in which ... images shot with the effective fields of views $\alpha 1$ and $\alpha 2$ of the fish-eye cameras 36, respectively, are overlapped.”

J “In this manner, images picked up by the fish-eye cameras 36 are integrated, and one bird's-eye

view image is displayed on the display device 42 ... Thus, this image is easier for the driver to view.”

4. Differences between the Patented Invention and Cited Invention 1 which have been found by the Court X

[Difference 1]

Relating to the operation of a controller, according to the Patented Invention, “an output image portion corresponding to the overlapping area” is generated by synthesizing captured images. On the other hand, according to the Cited Invention 1, it is not specified how an output image portion corresponding to an overlapping area is generated from images shot by neighboring cameras having an overlapping area in their monitoring ranges.

[Difference 2]

According to the Patented Invention, an output image is displayed on the display device “including the output image portions corresponding to the overlapping areas formed in the two directions.” On the other hand, according to the Cited Invention 1, it is not specified that an output image including such output image portion is displayed on a display device.

5. Discussion Points

The inventive step for the Patented Invention is disputed. In addition to Document 2, a plurality of references that describe techniques of generating output image regions corresponding to overlapping areas of images captured by plural cameras (“other well-known techniques”) do exist.

[Discussion Point 1] (Finding the Patented Invention)

In the claim of the Patented Invention, a generation of an output image portion by a controller is described in such a broad sense that the controller composites each captured image from the neighboring cameras to “generate an output image portion corresponding to the overlapping area.” On the other hand, the specific embodiment for the generation of an output image corresponding to the overlapping area is described in the detailed explanation for the Patented Invention (Items C and D).

In such case, for interpretation of the Patented Invention which is required for the determination of an inventive step, is it appropriate to literally interpret the wording “generate an output image portion corresponding to the overlapping area” in a broad sense? Or, considering the detailed description, is it appropriate to interpret the wording solely to correspond to the specific embodiment?

[Discussion Point 2] (Finding of matters described in Document 1)

According to the solution indicated in FIG. 16 of Document 1, three combined images that have been separately generated (a bird's-eye image and camera images) are combined to generate a display image. It is understood that output images are not used to generate overlapping areas. On the other hand, overlapping areas exist in images shot by a plurality of cameras in FIG. 2 of Document 1.

In such case, is it appropriate to find that there is a description in Document 1 about generating an output image portion corresponding to an overlapping area? Or, is it appropriate to find that there is no description in Document 1 about that?

[Discussion Point 3] (Consideration of the content of “publicly known art document” described in the cited document)

Document 2 is described as “publicly-known art” in Item F of Document 1. When another document is mentioned as “publicly-known art” in a cited document, is it appropriate to find the cited invention while treating matters described in the said another document as described (or being equal to be described) in the said document?

Specifically in this case, considering Document 2 illustrated as “publicly-known art” in Item F of Document 1, is it appropriate to find that the generation of an output image in Document 1 includes generating an output image portion corresponding to an overlapping area?

[Discussion Point 4] (Advantageous effects of the Patented Invention)

Even in the case where the constitution of the Patented Invention is at a glance considered to be easily conceived of by a person skilled in the art based on Document 1, if the effects produced by the Patented Invention are advantageous in comparison with those in Document 1, will such advantageous effects be considered as a condition to affirm an inventive step of the Patented Invention?

Furthermore, in the detailed description of the Patented Invention in this case example, the specific embodiment is stated as follows; “two input images with different average luminances form a lattice pattern which brings about ‘the same color illusion’.” The technical effect of the specific embodiment is stated as follows; “the operator who looks at the output image including areas R8 and R9 feels the image more natural and hence less uncomfortable” (Items C and D). On the other hand, in the claims of the Patented Invention, the generation of an output image portion by a controller is described in such a broad sense that the controller synthesizes each captured image from the neighboring cameras to “generate an output image portion corresponding to the overlapping area.” In such case, is it appropriate to take into consideration the technical effect of the said specific embodiment as advantageous effects of the Patented Invention and use such technical effects to affirm an inventive step of the Patented Invention?

End of document

(Reference Decision)

Appeal Number	Appeal No. 2015-22933
Date of Court Decision	September 25, 2017, The IP High Court
Case Number	2016 (Gyo-ke) 10264
Major Issues	An inventive step of the patent (Finding of the cited invention, motivation for combining secondary prior art with primary prior art, and effects particular to the patented invention)