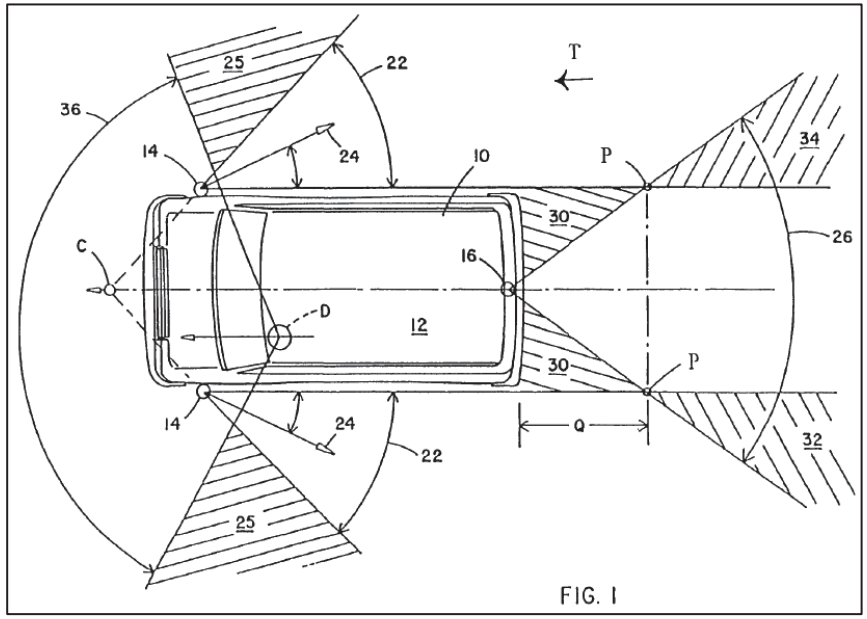
U.S. Patent No. 8,643,724	U.S. Patent No. 5,670,935
[1.] A multi-camera vision system for a vehicle, said vehicular multi-camera vision system comprising:	"a vehicle 10 . . . includes a rearview vision system, generally illustrated at 12, for providing a driver of the vehicle with a view rearwardly of the vehicle with respect to the direction of travel D of the vehicle (FIG. 1)." (C3:L50-56.)
[1.1] at least three image capture devices disposed at a vehicle equipped with said vehicular multi-camera vision system; [1.2] said at least three image capture devices comprising a first image capture device disposed at a driver-side portion of the equipped vehicle at a first location; [1.3] said at least three image capture devices comprising a second image capture device disposed at a passenger-side portion of the equipped vehicle at a second location; [1.4] said at least three image capture devices comprising a third image capture device disposed at a rear portion of the equipped vehicle at a third location;	"Vision system 12 includes at least two side image capture devices 14 positioned, respectively, on opposite sides of vehicle 10 and a center image capture device 16 positioned on the lateral centerline of the vehicle." (C3:L56-59.)  FIG. 1 "The present invention provides techniques for synthesizing images captured by individual, spatially separated, image capture devices into such ideal image, displayed on the display device. This may be accomplished according to an aspect of the invention by providing at least three image capture devices. At least two of the image capture devices are side image capture devices mounted on opposite sides of the vehicle. At least one of the image capture devices is a center image capture device mounted laterally between the side image capture devices." (C2:L39-48.)

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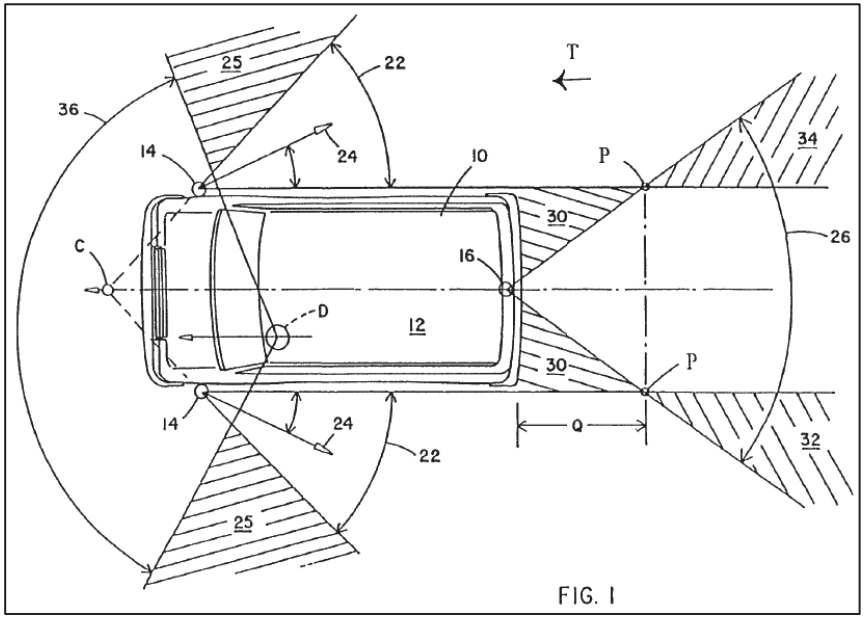
[1.5] wherein said first image capture device has a first field of view exterior of the equipped vehicle; [1.6] wherein said second image capture device has a second field of view exterior of the equipped vehicle; [1.7] wherein said third image capture device has a third field of view exterior of the equipped vehicle;	"Each of side image capture devices 14 has a field of view 22 and is aimed rearwardly with respect to the vehicle about an axis 24 which is at an angle, with respect to the vehicle, that is half of the horizontal field of view of the image capture device. In this manner, each of the image capture devices 14 covers an area bounded by the side of the vehicle and extending outwardly at an angle defined by the horizontal field of view of the respective side image capture device. Center image capture device 16 has a horizontal field of view 26, which is symmetrical about the longitudinal axis of the vehicle. The field of view of each side image capture device 14 intersect the field of view of center image capture device 16 at a point P which is located a distance Q behind vehicle 10." (C4:L14-27.)  FIG. 1
[1.8] wherein said first field of view of said first image capture	"The field of view of each side image capture device 14 intersect the field of view of center image capture device 16 at a point P which is located a distance Q behind vehicle 10." (C4:L24-

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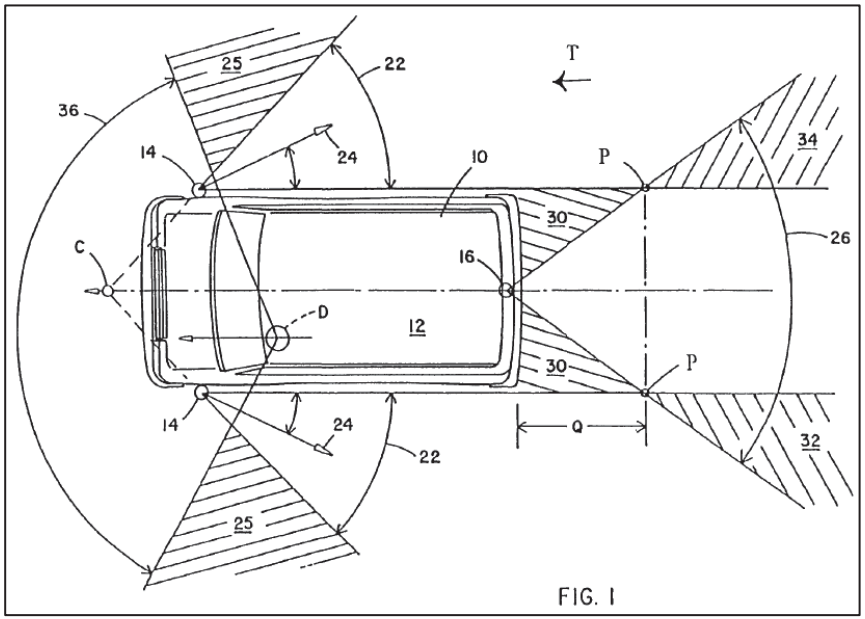
device overlaps with said third field of view of said third image capture device defining a first overlap zone; [1.9] wherein said second field of view of said second image capture device overlaps with said third field of view of said third image capture device defining a second overlap zone;	27.) "A left overlap zone 32 and a right overlap zone 34 extend rearward from respective points P where the horizontal fields of view of the side image capture devices intersect the field of view of center image capture device 16. Overlap zones 32, 34 define areas within which an object will be captured both by center image capture device 16 and one of the side image capture devices 14." (C5:L3-9.)  FIG. 1
[1.10] wherein said first image capture device captures first image data; [1.11] wherein said second image capture device captures second image data;	"Referring to FIG. 3, image display device 20 displays a composite image 42 made up of a left image portion 44, a right image portion 46, and a center image portion 48. Each image portion 44-48 is reversed from the image as captured by the respective image capture device 14, 16 utilizing conventional techniques. These techniques include reading the image in reverse with the image capture device, writing the image in reverse to display device 20, or reversing the image in image processor 18. Left image portion 44 is joined with central image portion 48 at a

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[1.12] wherein said third image capture device captures third image data;	boundary 50. Central image portion 48 is joined with right image portion 46 at a boundary 52." (C5:L48-59.)
[1.13] an image processor;	"Rearview vision system 12 additionally includes an image processor 18 for receiving data signals from image capture devices 14, 16 and synthesizing, from the data signals, a composite image 42 which is displayed on a display 20." (C3:L61-65.)
[1.14] wherein first image data captured by said first image capture device is received at said image processor via at least one of an analog data stream and a digital data stream; [1.15] wherein second image data captured by said second image capture device is received at said image processor via at least one of an analog data stream and a digital data stream; [1.16] wherein third image data captured by said third image capture device is received at said image processor via at least one of an analog data stream and a digital data stream;	"Each image-capturing device 14, 16 is controlled by appropriate supporting electronics (not shown) located in the vicinity of the imaging array such that, when operating power is supplied, either an analog or a digital data stream is generated on an output signal line supplied to image processor 18." (C7:L28-33.)
[1.17] wherein, responsive to processing by said image processor of received image data, a synthesized image is generated without duplication of objects	"As will be set forth in more detail below, the images captured by image capture devices 14, 16 are juxtaposed on display 20 by image processor 18 in a manner which approximates the view from a single virtual image capture device positioned forwardly of the vehicle at a location C and facing rearwardly of the vehicle, with the vehicle being transparent to the view of the virtual image capture device." (C3:L66-C4:L5.)

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present in said first overlap zone and in said second overlap zone and wherein said synthesized image approximates a view as would be seen by a virtual camera at a single location exterior of the equipped vehicle; and	"Vision system 12 provides a substantially seamless panoramic view rearwardly of the vehicle without duplicate or redundant images of objects." (C4:L6-8.) "Referring to FIG. 3, image display device 20 displays a composite image 42 made up of a left image portion 44, a right image portion 46, and a center image portion 48. Each image portion 44-48 is reversed from the image as captured by the respective image capture device 14, 16 utilizing conventional techniques. These techniques include reading the image in reverse with the image capture device, writing the image in reverse to display device 20, or reversing the image in image processor 18. Left image portion 44 is joined with central image portion 48 at a boundary 50. Central image portion 48 is joined with right image portion 46 at a boundary 52. As may best be seen in FIG. 3, the image portions at boundaries 50 and 52 are continuous whereby composite image 42 is a seamless panoramic view rearwardly of the vehicle. As also is apparent from FIG. 3, central image portion 48 is narrower than either left image portion 44 or right image portion 46. This is a result of reducing the horizontal field of view 26 of center image capture device 16 sufficiently to move points P, and thus overlap zones 32 and 34, a sufficient distance behind vehicle 10 to reduce redundant and duplicative images between image portions 44-48. Composite image 42 provides a clear image, which avoids confusion and simplifies the task of extracting information from the multiple image portions 44-48." (C5:L48-C6:L5.)
[1.18] wherein said synthesized image is displayed by a single display screen of a reconfigurable display device that is viewable by a driver of the equipped vehicle when normally operating the equipped vehicle.	"Rearview vision system 12 additionally includes an image processor 18 for receiving data signals from image capture devices 14, 16 and synthesizing, from the data signals, a composite image 42 which is displayed on a display 20." (C3:L61-65.) "As also may be seen by reference to FIG. 3, display 20 may additionally include indicia such as the readout of a compass 54, vehicle speed 56, turn signals 58, and the like as well as other graphical or video displays, such as a navigation display, a map display, and a forward-facing vision system. In this manner, rearview vision system 12 may be a compass vision system or an information vision system." (C6:L5-12.)

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