US005515042A

United States Patent [19]

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[11] Patent Number: 5,515,042

[45] Date of Patent: May 7, 1996

[54] **TRAFFIC ENFORCEMENT DEVICE**

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[21] Appl. No.: **375,900**

[22] Filed: **Jan. 20, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 110,721, Aug. 23, 1993, abandoned.

[51] **Int. Cl.**[6] **G08G 1/01**

[52] **U.S. Cl.** **340/937**; 340/936; 364/438; 348/118; 348/149

[58] **Field of Search** 340/937, 936, 340/934, 436, 449, 935, 995, 990; 364/437, 436, 438; 348/113, 118, 148, 149

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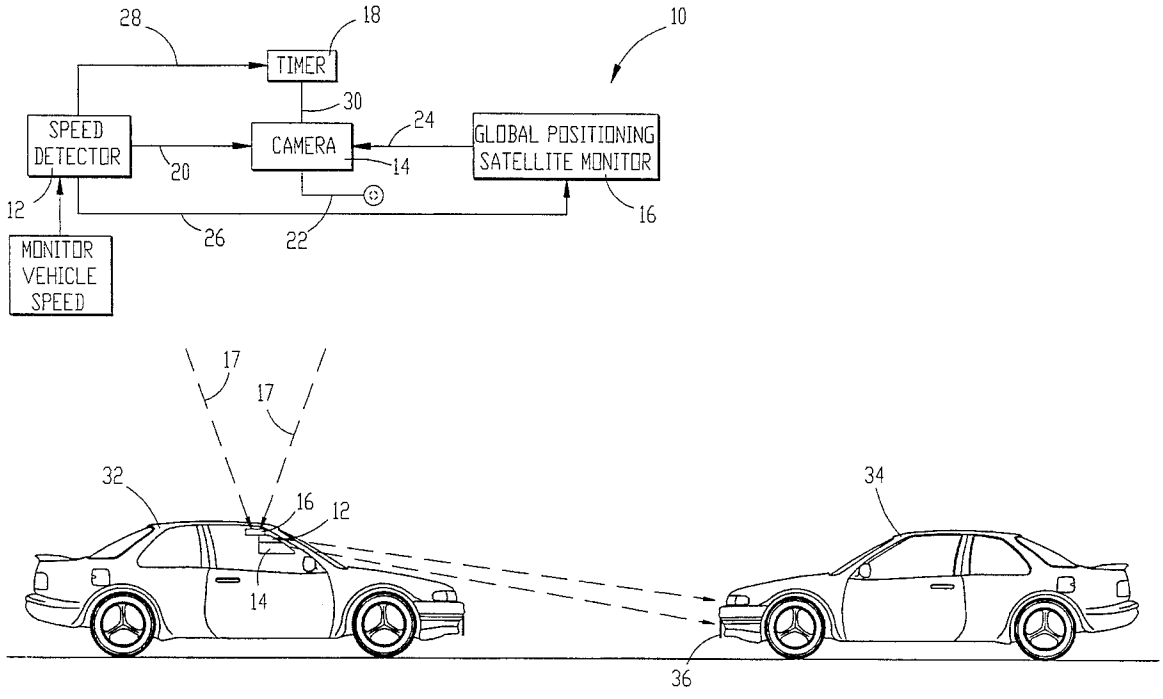
[57] **ABSTRACT**

An improved traffic monitoring and evidence gathering device (**10**) is provided which can be mounted in a mobile monitoring vehicle (**32**) in order to monitor vehicle traffic speed and, when a speeding violation is detected, to generate a vehicle-identifying image (**38**) having date, time, vehicle speed and location information imposed thereon. The device (**10**) includes a speed detector (**12**) operably coupled with a camera (**14**) and global positioning monitor (**16**); the monitor (**16**) is also connected to camera (**14**). When a monitored vehicle's speed exceeds a predetermined magnitude, the detector (**12**) generates an output serving to initiate operation of the camera (**14**) and satellite monitor (**16**), and to deliver speed information to the camera (**14**). The camera (**14**) creates a vehicle-identifying image (**38**), and imposes on the image (**38**) the speed and position information.

1 Claim, 1 Drawing Sheet



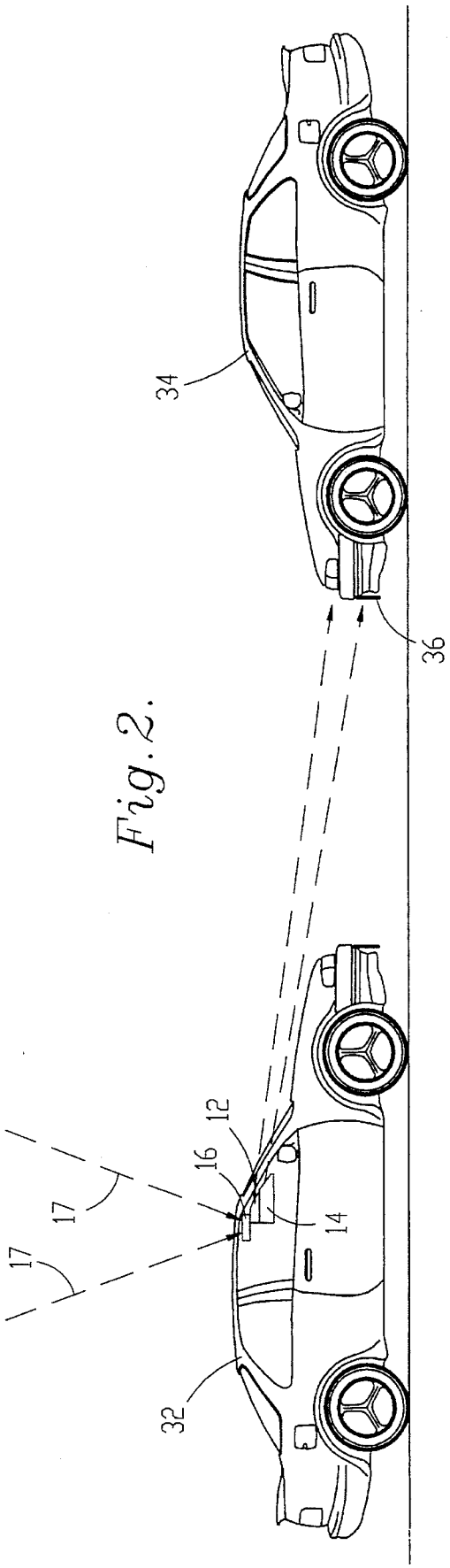


Fig. 2.

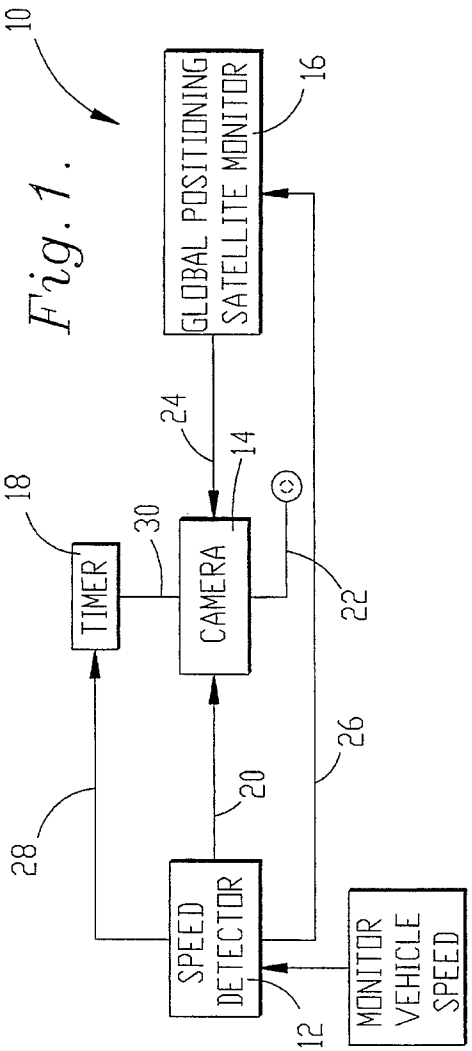


Fig. 1.

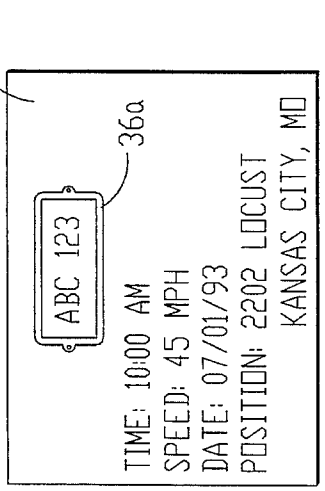


Fig. 3.

TRAFFIC ENFORCEMENT DEVICE

This application is a continuation of application Ser. No. 08/110,721, filed 08/23/93, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is broadly concerned with an improved traffic enforcement device of the type designed to provide rapid, accurate and legally admissible evidence pertaining to the identification, speed and location of moving vehicles. More particularly, the invention pertains to a mobile unit designed to be carried in a monitoring vehicle and which includes a traffic speed detector (e.g. a radar or laser speed detector), a camera and global positioning satellite monitor; these components are operably coupled so that, when a moving vehicle being monitored exceeds a predetermined speed limit, an identifying image of the vehicle is taken via the camera, and both speed and location information from the detector and monitor is imposed upon the image.

2. Description of the Prior Art

Simple hand-held or mobile speed detectors using radar or laser technology have long been available and are the bane of drivers habitually exceeding speed limits. Generally speaking, in the use of these devices extraneous evidence is required regarding the date, time of day, and location of the speeding offense. As a consequence, the testimony of the arresting officer is generally required to ensure a conviction of the traffic offender.

A recent innovation in traffic enforcement equipment combines a stationary camera and speed detecting equipment. In such devices, the camera is placed at a fixed location and is coupled with the speed detector. When a speeder passes the fixed location, the detector operates and the camera is simultaneously activated to create an identifying image of the vehicle, typically by photographing the vehicle's license plate. In order to increase the evidentiary impact of the image, the speed information from the speed detector is imposed on the image. However, these units cannot readily be used from a mobile platform, inasmuch as they provide no evidence regarding the particular location of a speeding offense. A combination device of this type is disclosed in U.S. Pat. No. 4,988,994, which is incorporated by reference herein.

Global positioning satellite monitors as a part of complete global positioning systems (GPS) have recently become available. This equipment is highly accurate, and can effectively provide the user with location information by receiving multiple satellite signals. Civilian use global positioning systems of this character can readily ascertain locations within one hundred meters of true locations. Exemplary GPS equipment is disclosed in U.S. Pat. Nos. 4,903,212 and 5,198,831; these patents are incorporated by reference herein.

SUMMARY OF THE INVENTION

The present invention overcomes the problems outlined above, and provides improved traffic monitoring and evidence gathering devices for use in mobile traffic monitoring vehicles, in order to provide an accurate and convenient technique for monitoring traffic speeds and issuance of valid, enforceable traffic citations.

Broadly speaking, the device of the invention includes traffic speed detecting means for determining the absolute speed of a moving vehicle proximal to a monitoring vehicle. The detector is operable for generating a detection output, including speed information establishing the absolute speed of the vehicle, when such absolute speed exceeds a predetermined magnitude. Exemplary speed detectors useful in the context of the invention include radar or laser detectors.

The devices hereof also include a camera operably coupled with the speed detecting means for receiving speed information therefrom, and for creating an identifying image of the moving vehicle in response thereto. Such a camera may be a conventional still photographic camera, or more usually a video camera (camcorder). In any case, the camera is oriented in the moving vehicle for uniquely identifying a vehicle being monitored, typically by creating an image of the vehicle's license plate. Where a video camera is employed, a zoom lens can be used to not only create an image of the license plate, but also the moving vehicle as a whole. Also, use of a video camera allows a microphone to be employed, so that the operator of the monitoring vehicle can record his or her comments about the monitored vehicle.

The overall device of the invention further includes a global positioning satellite monitor which is coupled with the speed detecting means and camera. The satellite monitor is operable for creating position-identifying information about the monitoring vehicle, in response to detection output from the speed detector; this position-identifying information is in turn delivered to the camera.

In order to create the optimum evidence of a speeding infraction, the camera includes means for imposing the speed information from the detecting means and the position-identifying information from the satellite monitor onto the identifying image of the monitored vehicle.

Generally, if use is made of the preferred video camera, the date and time may be readily imposed on the recorded image as a part of the video camera's normal operation. Alternately, if this function is not present, a separate timer may be coupled to the speed detector and camera for this purpose.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic block diagram of the traffic monitoring and evidence gathering device of the invention;

FIG. **2** is a schematic representation illustrating use of the device of the invention from a mobile monitoring vehicle; and

FIG. **3** is a schematic representation of a representative vehicle-identifying image having time, speed and position information imposed thereon.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, and particularly FIG. **1**, a traffic monitoring and evidence gathering device **10** is depicted. Broadly, the device **10** includes a speed detector **12**, camera **14** and a global positioning satellite monitor **16**. Where camera **14** is not equipped with a timer, a separate timer **18** may be provided.

In more detail, speed detector **12** is of conventional design and may be of the radar or laser variety. The detector **12** is operable for generating a detection output including speed information establishing the absolute speed of a moving vehicle, when the latter exceeds a predetermined magnitude.

To this end, the detector **12** would typically include an input with the monitoring vehicle's speed and conventional comparison circuitry for generating accurate speed information about the moving vehicle being monitored. Also, such a detector would normally have an audible or visually observable alarm which would be activated when a speed in excess of the predetermined magnitude was detected. Such an alarm would allow the user to initiate operation of the overall device **10** by pushing an operator button; alternately, such operation could be automatically initiated without an intervening alarm and operator action.

As indicated above, camera **14** may be of the still or video variety, but is preferably the latter. The camera **14** is coupled to speed detector **12** via connection **20**, which allows the camera to receive absolute speed information from the detector. A microphone **22**, typically a part of a video camera, may also be activated and used during the operation of the camera.

The satellite monitor **16** is also of conventional design and is operably coupled with camera **14** via connection **24**. The monitor **16** is a part of a GPS, and is used to create position-identifying information about the monitoring vehicle, and for delivering this information to the camera **14**.

The detector **12** and monitor **16** are also interconnected by means of connector structure **26**. And if necessary, the separate timer **18** is coupled to detector **12** via connector **28**, and to camera **14** via connector **30**.

The device **10** is mounted in a mobile monitoring vehicle **32** (see FIG. **2**), usually on the dashboard thereof. The camera **14** is oriented for recording and imaging of vehicles to be monitored, such as vehicle **34**, in order to provide a unique identifying image thereof. For this purpose, the camera **14** would normally be positioned to record an image of the license plate **36** of the vehicle **34**. As a useful option, the camera **14** may include a zoom lens so that the license plate image can be taken and in addition the lens can be shifted so as to record an image of the entire vehicle **34**.

The speed detector **12** would also normally be dashboard-mounted and generally aligned with the camera **14** so that the two components would be directed at the same vehicle at the same time.

Finally, the monitor **16** would be placed at some convenient position within the monitoring vehicle **32**, but in this case there is no particular need for a dashboard mount. As illustrated in FIG. **2**, the monitor **16** is operable to receive signals **17** from a plurality of orbiting satellites.

In use, the monitoring vehicle **32** would proceed among normal traffic with the detector **12** operating. This would be in a manner exactly analogous to conventional radar or laser detectors now in use, i.e., the operator vehicle **32** would position the vehicle so as to properly monitor successive vehicles **34** in the traffic stream.

When a given vehicle **34** was detected as traveling at a speed in excess of the predetermined limit of the detector **12**, the latter would operate (either automatically or via an alarm and consequent user activation) to generate a detector output, including speed information establishing the absolute speed of the monitored vehicle. This detector output would in turn activate the satellite monitor **16**, initiate camera operation, and deliver the absolute speed information to camera **14**. The monitor **16** would, upon receipt of the relevant satellite signals, calculate the position of the monitoring vehicle **32**, and this information would be sent via connection **24** to the camera **14**.

The camera **14** during its operational sequence will generate a uniquely identifying image **38** (FIG. **3**) of the vehicle **34**, in response to detection output from detector **12**. As described previously, this identifying image would typically include an image **36**a of the license plate **36** of the vehicle **34**. Additionally, the camera **14** is operable for imposing upon the image **38** the absolute speed and position-identifying information received from the detector **12** and monitor **16**, respectively. As illustrated in FIG. **3**, the excess speed of the vehicle **34** (e.g., "45 MPH") would be imposed on the image **38**, as well as the position of the monitoring vehicle (e.g., latitude and longitude are converted to street address: "Main at Tenth"). Also, the date and time (e.g., "07/01/93" and "10:00AM") would also be imposed on the image **38**, through a built-in camera timer if available, or through auxiliary timer **18**.

Finally, if desired the operator of monitoring vehicle **32** could record his or her comments about the make, condition and operation of the monitored vehicle **34**, using microphone **22**. At the end of the operational sequence of device **10**, the components **12**, **14** and **16** are reset for the next use thereof, and the image(s) taken are preserved.

At the end of a shift for the operator of vehicle **32**, the various images taken during the course of the shift are recovered and reviewed. Traffic citations can then be issued to the owners of the monitored vehicles **34** observed during the shift to be traveling in excess of relevant speed limits. Inasmuch as the speed detection, imaging and positioning components of the device **10** are highly reliable and accurate, it is anticipated that identifying images **38** will be accorded significant evidentiary weight.

Those skilled in the art will appreciate that device **10** is useful in applications other than traffic speed enforcement. For example, if monitoring vehicle **32** were stopped and in position to record an event, such as a carjacking in progress, the speed indication provided by detector **12** would register "0 MPH" because no vehicle speed would be monitored. Nevertheless, the image captured by camera **14** would have the current location of the event recorded from the data provided by satellite monitor **16**. With the location information superimposed on the recorded image, very little doubt would remain as to the actual site. Thus, device **10** finds utility with the combination of camera **14** and satellite monitor **16** without the inclusion of speed detector **12**. In such a configuration, device **10** would be configured so that activation of camera **14** would result in location information from satellite monitor **16** being superimposed on the recorded image.

I claim:

1. A method of monitoring traffic speed and for gathering evidence, said method comprising the steps of:

providing a monitoring vehicle equipped with a traffic speed monitoring and evidence gathering device, said device having traffic speed detecting means for determining the absolute speed of a moving vehicle proximal to said monitoring vehicle, and for generating detection output including speed information establishing the absolute speed of said moving vehicle when said absolute speed exceeds a predetermined magnitude;

a video camera operably coupled with said detecting means for receiving said speed information, and for creating an identifying moving video image of said moving vehicle in response to said speed information,

said video camera including zoom lens means for taking the zoom image of the license plate of said moving vehicle, and for taking the full image of the entirety of the moving vehicle,

said video camera also including microphone means for recording the audible observations of said operator relative to said moving vehicle; and

a global positioning system monitor operably coupled with said speed detecting means and said speed detecting means and said camera for creating position-identifying information about said monitoring vehicle, and for delivering said position-identifying information to said camera only in response to said detection output,

said camera including means for imposing said speed information, said audible observations and said position-identifying information on said zoom and full images;

placing an observer within said monitoring vehicle, and causing the monitoring vehicle to travel on a roadway where a moving vehicle is found;

operating said traffic speed detecting means to determine the absolute speed of said moving vehicle;

when said absolute speed exceeds said predetermined magnitude, operating said video camera and said zoom lens means to take a zoom image of the license plate of said moving vehicle and the full image of the moving vehicle;

causing said operator to audibly speak observations into said microphone means about said moving vehicle; and

imposing on the image created by said video camera said speed information, said audible observations and said position-identifying information.

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