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(54) **System for monitoring and controlling the average speed of vehicles in transit, and surveying of traffic on roads and motorways**

System zur Überwachung und Steuerung der Durchschnittsgeschwindigkeit von sich bewegenden Fahrzeugen und zur Untersuchung des Verkehrs auf Strassen und Autobahnen

Système de surveillance et commande de la vitesse moyenne des véhicules en passage, et de l'inspection du trafic sur des routes et des autoroutes

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(56) References cited:
EP-A- 0 494 815 EP-A- 0 978 811
WO-A-01/35372 DE-A- 3 327 706
DE-A- 4 330 349 US-A- 5 878 367

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Description

[0001] The invention relates to a monitoring and control system for a stretch of motorway or main or local road, varying in length from a few metres to a few kilometres, operating 24-hours-a-day (except in meteorologically prohibitive conditions), and suitable for calculating the average speed of vehicles that pass through the said stretch of road under control, for detecting offences and for additional measurements, controls and so on.

[0002] In particular, the system is aimed at providing a deterrent for the purposes of discouraging the drivers of vehicles transiting through the monitored stretches from reaching speeds in excess of that permitted. A known system for this purpose (WO-A-0135372), via identification of the number plate of a vehicle transiting through the various local stations, is capable of supplying documentary evidence on the basis of which the relevant authorities can achieve the objective of being able to charge over-speeding offences, as the operator is able to read the number plate and additional data regarding the time, place and average speed when the speed limit is exceeded.

[0003] In this known system, reading the vehicle's registration number is sometimes difficult or at least uncertain, compromising the reliability of evidence. It is also hard to select the data relative to individual vehicles that arrives at the control centre, where the operators must read - with difficulty at times - the number plates.

[0004] The invention aims to eliminate the drawbacks of currently known systems by means of a system according to claim 1.

[0005] For this object and other possible objects specified in the following, the system under discussion for monitoring and controlling the average speed of vehicles and possible traffic surveys on roads and motorways, substantially consists of, in each of at least two local detection stations situated along the stretch of road under control: at least one infrared illuminator or equivalent, suitable for illuminating the rear three-quarters or rear of vehicles in transit; at least one telecamera - either black and white or colour - suitable for capturing a rear three-quarters or rear-view image; a computer equipped with an electronic interface suitable for processing, transmitting and receiving the signals of said at least one telecamera and to store, at least temporarily, the images and other identification data of vehicles in transit and to calculate the average speed maintained over the stretch of road relative to a neighbouring station, with which each local station is capable of dialoguing for these functions and in particular for detecting whether the permitted speed limit has been broken; a chronometric and synchronization device for synchronising with the various local stations; a remote station suitable for receiving images and other identification data of specific vehicles from the local stations; selecting means suitable for only sending photograms and other identification data to the

remote station for vehicles that have exceeded the speed limits between two local stations.

[0006] For dialoguing and transmitting vehicle photograms and other useful data (speed, time and other information), communications between the various local stations, and between these and the remote station, can be provided by various transceiver systems (GSM, mobile phones in general, optical fibre cables, radio or similar).

[0007] In practice, the remote station can include one or more computers equipped with electronic interfaces suitable for receiving and printing the photograms and other data sent by the local stations relative only to those vehicles that have exceeded the permitted speed limits, which are then used by the operators, in particular for identification of the plate number from at least two transmitted photograms showing images of the same vehicle.

[0008] In fact, with this arrangement the remote station only receives data relative to vehicles for which an offence is to be charged, and an operator is able to examine at least two different photograms of the same vehicle, can easily read the number plate, and can store both this information, as well as the photograms in question and the data values (times, average speed and transit chronology) for preparing a valid ticket.

[0009] In accordance with an additional development, one or both of the telecameras, or at least each of the local detection stations is also equipped with a directional microphone suitable for detecting the sound of each vehicle in transit, and storage means are also provided for saving, at least temporarily, said sounds, as well as means for comparing the captured sounds in at least two local stations; this constitutes an additional auxiliary element of identification with respect to that obtained via the images.

[0010] From amongst the elements, i.e. the vehicle identification parameters from the telecameras, to be used for the comparative analysis of images (and photograms) subsequently acquired by neighbouring local stations, the following can be indicated by way of example: the size of the vehicle; the detected colours; the layout of marks, writing and the like; the layout of colours, and so on. It is extremely improbable that two vehicles in transit in a brief period of time - necessary for passing between two neighbouring stations - with both having the same detected parameters and that - in addition - both vehicles exceed the speed limit (by the same amount). In conclusion, the system in question analyses the image of the vehicle, and possibly the sound as well, and encodes certain parameters (particularly relevant for the image as a whole) that are characteristic and which permit the individualisation and identification, obviously in statistical terms, of individual vehicles at individual local stations. In cases of infraction, this enables transmission of the photograms taken at different local stations - together with other data - to the remote station, which prints them so that the operator can perform a more detailed analysis, including reading the number

plate that remains visible in the photograms, which are also available for identification purposes.

[0011] The transmission of data relative to the number of vehicles in transit can also be provided, for the purposes of possible traffic surveys with relative travelling times.

[0012] Additional applications for the equipment in question can also be provided.

[0013] The principle informing the invention is illustrated, by way of example, in the drawing.

[0014] Figure 1 schematically shows the components of one of the local detection stations and the remote station, and

[0015] Figure 2 shows the installation on a two-lane motorway.

[0016] On one or both carriageways, and also on each of the lanes of one or both carriageways C1 and C2 to be controlled, a minimum of two local detection stations 1 and 2, with a distance between them that can even reach several kilometres, are required; station 1 is situated upstream and station 2 downstream with respect to the lane's direction of the traffic. Each local detection station, as for station 1 in Figure 2, includes (see Figure 1) an infrared (IR) illuminator 11 or equivalent, possibly of the directional type, suitable for illuminating the rear three-quarters or rear part of vehicles V in transit; IR illumination cannot be detected by drivers, even at night. Item 13 indicates a black and white or colour telecamera; more than one telecamera can be provided. Each of the local stations can also be equipped with one or more directional microphones, not illustrated. The telecamera is suitable for systematically taking the rear three-quarters or rear image of vehicles in transit in the available lane(s); the optional directional microphone is capable of capturing the sounds. Item 15 indicates the computer equipped with an electronic interface for the real-time processing of signals from the telecamera(s) - and from the optional microphone(s) - and for temporarily storing images and sounds of the vehicles in transit, and also for receiving data from a neighbouring local station for calculating the average speed of vehicles on the stretch of road between the two stations. A chronometric and synchronization device for synchronising with the various local stations, as well as a transceiver system 17 (GSM, mobile phones in general, cables, optical fibres, radio or similar) suitable for transmitting data between the various local stations and especially between neighbouring stations, are also provided.

[0017] The arrangement of the local stations is suited to permit photograms of vehicles that have exceeded the permitted speed limits along the stretch of road between the two local stations, together with the average speed and other data, especially chronological, to be sent to the remote station.

[0018] Item 5 indicates the remote station, which is destined to dialogue with at least one pair of local stations 1 and 2 or more subsequent local detection stations, positioned along the stretch of road to be controlled.

This remote station 5 includes (Figure 1) one or more computers equipped with an electronic interface 51 suitable for receiving and printing the photograms and other data sent by the local stations, which only regard vehicles that have exceeded the permitted speed limits, and a transceiver system capable of dialoguing with the systems 17 of the local stations.

[0019] As synchronisation is provided for the chronometric equipment on the various local stations along the stretch of road under control, it is possible for the various local stations to calculate the average speed of each vehicle in the said stretch and identify the vehicles that have exceeded the permitted limit. The remote station can thus receive from the various local stations only the photograms and other data - speed, chronometric and so on - relative to vehicles that have committed an offence. The remote station only prints and saves photograms and other useful data for bringing charges for an offence. Once the photograms are printed onto paper, an operator can easily use these photograms (at least two) to check the number plate and other data-time, place and average speed - relative to the vehicles for which the remote station has received the data from the local stations, while images and other acquired data relative to vehicles observing the law can be deleted directly from the memories of the local stations.

[0020] In practice, the local stations are required to store, at least temporarily, the data acquired via the telecamera(s) and/or microphone(s), and to perform the necessary processing to calculate the average speed, when the permitted limits are exceeded; it is also possible to count the vehicles in transit and the average transit times.

[0021] From the above description, it emerges that it is possible to carry out a control that is not of the customary type, on-the-spot and temporary, or occasional as is currently performed, but one that can be extended to monitor an entire stretch of road between multiple local stations and with continuous operation (even 24-hours-a-day), such that to remain within the law, the driver of a vehicle must keep an average speed within the permitted limits at all times and for the entire travelling distance between the various local stations; an average speed above the permitted limit within the controlled stretch of road (between two local stations) indicating that unlawful speeds have been reached.

[0022] The length of the stretch of road can vary significantly whilst still maintaining the same performance quality, with distances that could even extend to a few kilometres. The shorter the stretch of road between the two local stations, the more precise the speed-reading will be.

[0023] More stations in series can cover any stretch of road.

[0024] A fundamental prerogative of the system in question is that it can: reduce the volume of data converging on the remote station because only photograms and other pertinent data regarding vehicles for which the

local stations have detected an offence are sent; facilitate the operator in identifying the number plate data as at least two photograms and a large time span are available; operate 24-hours-a-day. As monitoring is performed via a telecamera, also capable of taking pictures at night, on condition that the telecamera's field of observation is illuminated by infrared illuminators or similar, readings in certain prohibitive meteorological conditions are to be excluded. Particular situations can also result in the exclusion or inclusion of sound data.

[0025] The system in question can operate in a completely automated manner, with the exception of evaluating the photograms, which must be performed by an operator, who will have at least two photograms on hand, one each from two neighbouring stations, for each vehicle that is considered to have committed an offence.

[0026] Even from the viewpoint of autonomy, there are no limits to continuous 24-hour-a-day operation as, considering that the devices can be mounted on existing electrified structures, such as traffic lights, lampposts, illuminated signboards, or other objects generally present on roads and motorways, the system is to be powered via the industrial mains. Obviously, this is all possible except in cases of force majeure.

[0027] The computer equipped with the electronic interface 15 of any local station connected to the telecamera 13 that observes the passage of vehicles (with the possibility of being equipped with directional microphones) is capable of dialoguing with a neighbouring local station, acquiring and temporarily storing the passage of the vehicles, performing identification, calculating the average speed and - should the permitted speed limits be exceeded - sending only the data and photograms pertaining to those vehicles that have committed an offence to the remote station.

[0028] To guarantee reliability in measurement of the average speed, the chronometric and synchronisation system must be able to correct possible misalignments between the clocks of the various local stations, so that possible time variances between the various local chronometric devices do not have repercussions on the calculation.

[0029] A certain tolerance is considered in any case, which serves to cover systematic errors and is generally expressed as a percentage of the calculated average speed. For example, if the system has a tolerance of 5%, this means that for a speed limit of 60 km/h., speeds above 63 km/h. will be considered as offences. It should also be considered that - under a certain aspect - the greater the distance between the various local stations, the more precise is the measurement of average speed, as even misalignments of a few seconds between the chronometric devices will have a minimal impact on the average speed calculation.

[0030] When a speeding offence is detected between two neighbouring local stations, they autonomously transmit the photograms (together with other data) to the remote station for the purposes of providing document-

ed evidence, so that, once the photograms are printed onto paper, the operator at the remote station can easily read the registration number, the time, place and average speed, and only for those vehicles that have committed an offence. Whatever its shape may be, the number plate can be read on at least two transmitted photograms.

[0031] For motives of space in the computer's memory, after the images relative to the offences to be charged have been sent to the remote station, all other images and data relative to vehicles passing by the local stations that observe the speed limits are deleted.

[0032] In conclusion, the images and sounds acquired locally by the various local stations are only stored for the time that is necessary for the local stations to perform the average speed calculation, when it is higher than the permitted limits, after which the temporarily stored images and sounds are deleted, whilst information regarding the number of vehicles in transit and the time of transit is permanently stored. This information can also be deleted when it is no longer of use.

[0033] Traffic flow calculations over specific periods of time and specific times of day and/or specific days of the week and so on, always based on the acquired data, chronologically selected and counted, and possibly acquired by only one of the two local stations, can easily be provided.

[0034] The installation can also permit a selection between vehicles of the heavy and industrial type and light vehicles like cars, on the basis of an acquired dimension, height or width for example; in this way, selective calculations for statistical and other purposes can be made.

[0035] It is understood that the drawing does not illustrate anything other than an exemplification, given purely as a practical demonstration of the invention, the forms and arrangements of which may vary without leaving the scope of the concept forming the invention. The possible presence of reference numbers in the attached claims has the purpose of facilitating reading thereof with reference to the description and to the table of drawings, and in no way limits the sphere of protection represented by the claims.

Claims

1. A system for monitoring and controlling the average speed of vehicles in transit, and for surveying of traffic on roads and motorways, utilizing local detection stations (1, 2) along the stretch of road to be controlled, including:
 - in each of at least two local detection stations (1, 2) at some distance from each other: at least one infrared illuminator (11), suitable for illuminating the rear three-quarters or rear of vehicles in transit; at least one black and white or

colour telecamera (13) for capturing a rear three-quarters or rear-view image; a computer (15) equipped with an electronic interface and programmed for processing, transmitting and receiving the signals of at least one other local detection station, and storing at least temporarily the images and other data regarding the vehicles in transit, and calculating the average speed maintained along the stretch of road relative to a neighbouring station with which each local detection station is capable of dialoguing for detecting the breaking of the permitted speed limit; a chronometric and synchronization device for synchronising with the various local detection stations; and

- a remote station (5) suitable for receiving images and other identification data of specific vehicles from the local detection stations;

wherein each local detection station (1, 2) further comprises

means (15) which select and send to the remote station only the images and identification data relative to vehicles that have exceeded the speed limits between two local detection stations.

2. The system as in Claim 1, **characterized in that** the computer in each of said local detection stations is programmed such that it analyzes the image of a vehicle and encodes certain vehicle identification parameters which permit the individualisation and identification in statistical terms of individual vehicles at individual local detection stations.

3. The system as in Claim 1 or 2, **characterized in that** it includes means for dialoguing between the local detection stations and between these and the remote station, chosen from transceiver systems that are also suitable for transmitting images of vehicles, as well as data relating to speed, and time..

4. The system as in any of the previous Claims, **characterized in that** the dialogue between local detection stations is limited to a number of characteristic data items of a vehicle image, to permit recognition by the local detection station receiving said data, while the remote station receives complete photographic images of each vehicle for which an offence has been detected, as well as the data required for issuance of a speed limit violation citation.

5. The system as in any of the previous Claims, **characterized in that** the remote station includes one or more computers equipped with electronic interfaces (51) suitable for receiving and printing the images and other data sent by the local detection stations relative only to those vehicles that have exceeded the permitted speed limits; wherein said im-

ages can be compared by the operators and used also for identifying the vehicle registration number.

6. The system as in any of the previous Claims, **characterized in that:** each of the local detection stations is also equipped with a directional microphone suitable for detecting the sounds of each vehicle in transit; and that means are provided for the storage, at least temporarily, of the said sounds, as well as means for comparing the sounds captured by at least two local detection stations.

7. The system as in Claim 2, **characterized in that** the vehicle identification parameters, for the comparative analysis of images successively captured by neighbouring local detection stations, include: the dimensions of the vehicle; the detected colours; the layout of marks, writing and the like; the layout of colours.

8. The system as in claim 6, **characterized in that** said vehicle identification parameters further include the noises and sounds detected by said microphones.

9. The system as in at least one of the previous Claims, **characterized in that** it includes means for calculating the number of vehicles in transit, for surveys on traffic and relative travelling times.

10. The system as in at least one of the previous Claims, **characterized in that** it includes means for differentiating between light and heavy vehicles in function of one or more characteristic dimensions, and means for counting the consequently differentiated vehicles.

Patentansprüche

1. System zur Überwachung und Steuerung der Durchschnittsgeschwindigkeit von unterwegs befindlichen Fahrzeugen sowie zur Untersuchung des Verkehrs auf Straßen und Autobahnen unter Verwendung lokaler Erfassungsstationen (1, 2) entlang der zu steuernden Straßenstrecke, umfassend:

- in jeder von mindestens zwei etwas voneinander beabstandeten lokalen Erfassungsstationen (1, 2): mindestens einen Infrarotilluminator (11), der geeignet ist, die hinteren drei Viertel oder das Heck von unterwegs befindlichen Fahrzeugen anzustrahlen; mindestens eine Schwarzweiß- oder Farb-Teleobjektivkamera (13) zur Aufnahme eines Bildes von den hinteren drei Vierteln oder vom Heck; einen Computer (15), der mit einer elektronischen Schnittstelle ausgerüstet ist und zur Verarbeitung,

- Übertragung und zum Empfang der Signale von mindestens einer anderen lokalen Erfassungsstation sowie zum mindestens vorübergehenden Speichern der Bilder und anderer Daten in Bezug auf die unterwegs befindlichen Fahrzeuge und zur Berechnung der erhaltenen Durchschnittsgeschwindigkeit entlang der Straßenstrecke bezogen auf eine Nachbarstation, mit der jede lokale Erfassungsstation in Dialog treten kann, um eine überschreitung der zulässigen Höchstgeschwindigkeit zu erfassen, programmiert ist; eine Zeitmess- und Synchronisierungsvorrichtung zur Synchronisierung mit den verschiedenen lokalen Erfassungsstationen; und
- eine entfernt gelegene Station (5), die geeignet ist, Bilder und andere Identifizierungsdaten besonderer Fahrzeuge von den lokalen Erfassungsstationen zu empfangen; wobei jede lokale Erfassungsstation (1, 2) des Weiteren Mittel (15) umfasst, welche nur die Bilder und Identifizierungsdaten auswählen und zu der entfernt gelegenen Station senden, welche sich auf Fahrzeuge beziehen, welche die Höchstgeschwindigkeit zwischen zwei lokalen Erfassungsstationen überschritten haben.
2. System nach Anspruch 1, **dadurch gekennzeichnet, dass** der Computer in jeder der lokalen Erfassungsstationen so programmiert ist, dass er das Bild eines Fahrzeugs auswertet und bestimmte Fahrzeugidentifizierungsparameter verschlüsselt, welche unter statistischen Bedingungen die Individualisierung und Identifizierung einzelner Fahrzeuge an einzelnen lokalen Erfassungsstationen ermöglichen.
 3. System nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** es Mittel für einen Dialog zwischen den lokalen Erfassungsstationen und zwischen diesen und der entfernt gelegenen Station umfasst, ausgewählt aus Transceiver-Systemen, die auch zur Übertragung von Bildern von Fahrzeugen sowie von Daten bezüglich Geschwindigkeit und Zeit geeignet sind.
 4. System nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Dialog zwischen lokalen Erfassungsstationen auf eine Anzahl charakteristischer Datenpunkte eines Fahrzeugbildes beschränkt ist, um die Erkennung durch die lokale Erfassungsstation zu ermöglichen, welche diese Daten empfängt, während die entfernt gelegene Station komplette fotografische Bilder jedes Fahrzeugs empfängt, für das ein Vergehen festgestellt wurde, sowie auch die Daten, die für die Ausstellung einer Vorladung wegen Geschwindigkeitsübertretung erforderlich sind.
 5. System nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die entfernt gelegene Station einen oder mehrere Computer umfasst, die mit elektronischen Schnittstellen (51) ausgerüstet sind, die geeignet sind, die Bilder und andere von den lokalen Erfassungsstationen nur in Bezug auf jene Fahrzeuge, welche die zulässigen Höchstgeschwindigkeiten überschritten haben, gesendete Daten zu empfangen und zu drucken, wobei die Bilder durch die Bediener verglichen und auch zur Identifizierung der Kraftfahrzeugszulassungsnummer verwendet werden können.
 6. System nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jede der lokalen Erfassungsstationen auch mit einem Richtmikrophon ausgerüstet ist, das geeignet ist, die von jedem unterwegs befindlichen Fahrzeug erzeugten Geräusche zu erfassen, und dass Mittel zur mindestens vorübergehenden Speicherung dieser Geräusche sowie Mittel zum Vergleich der aufgenommenen Geräusche durch mindestens zwei lokale Erfassungsstationen vorgesehen sind.
 7. System nach Anspruch 2, **dadurch gekennzeichnet, dass** die Fahrzeugidentifizierungsparameter für die vergleichende Analyse von Bildern, die von benachbarten lokalen Erfassungsstationen nacheinander aufgenommen wurden, folgende Elemente umfassen: die Abmessungen des Fahrzeugs; die erfassten Farben; die Ausführung von Zeichen, Aufschrift und Ähnlichem; die Farbgestaltung.
 8. System nach Anspruch 6, **dadurch gekennzeichnet, dass** die Fahrzeugidentifizierungsparameter des Weiteren das von den Mikrofonen erfasste Rauschen und die Geräusche umfassen.
 9. System nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** es zur Untersuchung des Verkehrs und jeweiliger Reisezeiten Mittel zur Berechnung der Anzahl der unterwegs befindlichen Fahrzeuge umfasst.
 10. System nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** es Mittel zur Unterscheidung zwischen leichten und schweren Fahrzeugen als Funktion einer oder mehrerer charakteristischer Abmessungen und Mittel zum Zählen der dermaßen differenzierten Fahrzeuge umfasst.

Revendications

1. Système de surveillance et de contrôle de la vitesse moyenne de véhicules en passage, et d'inspection du trafic sur des routes et des autoroutes, utilisant

des stations de détection locales (1, 2) le long du tronçon de route à contrôler, comprenant :

- dans chacune des au moins deux stations de détection locales (1, 2) placées à une certaine distance l'une de l'autre : au moins un illuminateur à infrarouge (11) adapté pour illuminer les trois-quarts arrière ou l'arrière de véhicules en passage ; au moins une caméra de prises de vues en noir et blanc ou en couleurs (13) permettant de prendre une image en vue arrière ou trois-quarts arrière ; un ordinateur (15) équipé d'une interface électronique et programmé pour traiter, transmettre et recevoir les signaux d'au moins une autre station de détection locale, mémoriser au moins temporairement les images et autres données concernant les véhicules en passage et calculer la vitesse moyenne conservée le long du tronçon de route par rapport à une station voisine avec laquelle chaque station de détection locale peut dialoguer afin de détecter le dépassement de la vitesse limite autorisée ; un dispositif de chronométrage et de synchronisation conçu pour se synchroniser avec les différentes stations de détection locales ; et
- une station distante (5) adaptée pour recevoir des images et d'autres données d'identification de véhicules spécifiques provenant des stations de détection locales ;

dans lequel chaque station de détection locale (1, 2) comprend en outre :

- des moyens qui sélectionnent et n'envoient à la station distante que les images et les données d'identification relatives aux véhicules qui ont dépassé les limitations de vitesse entre deux stations de détection locales.

2. Système selon la revendication 1, **caractérisé en ce que** l'ordinateur dans chacune desdites stations de détection locales est programmé de manière à analyser l'image d'un véhicule et à encoder certains paramètres d'identification du véhicule qui permettent l'individualisation et l'identification en termes statistiques de véhicules individuels au niveau de stations de détection locales individuelles.
3. Système selon la revendication 1 ou 2, **caractérisé en ce qu'il** comprend des moyens adaptés pour établir un dialogue entre les stations de détection locales et entre celles-ci et la station distante, choisis parmi des systèmes émetteurs-récepteurs, qui sont également adéquats pour transmettre des images de véhicules, ainsi que des données concernant la vitesse, le jour et l'heure.

4. Système selon l'une quelconque des précédentes revendications, **caractérisé en ce que** le dialogue entre les stations de détection locales est limité à un nombre d'éléments de données caractéristiques d'une image de véhicule, de façon à permettre une reconnaissance par la station de détection locale recevant lesdites données, tandis que la station distante reçoit des images photographiques complètes de chaque véhicule pour lequel une infraction a été détectée, ainsi que les données requises pour la délivrance d'une citation pour dépassement de la limitation de vitesse.

5. Système selon l'une quelconque des précédentes revendications, **caractérisé en ce que** la station distante comprend un ou plusieurs ordinateurs équipés d'interfaces électroniques adaptées pour recevoir et imprimer les images et d'autres données envoyées par les stations de détection locales concernant uniquement les véhicules qui ont dépassé les vitesses limites autorisées ; dans lequel lesdites images peuvent être comparées par les opérateurs et également être utilisées pour identifier le numéro d'immatriculation du véhicule.

6. Système selon l'une quelconque des précédentes revendications, **caractérisé en ce que** : chacune des stations de détection locales est également équipée d'un microphone directionnel adapté pour détecter les sons de chaque véhicule en passage ; et **en ce que** des moyens sont prévus pour permettre la mémorisation, au moins temporairement, desdits sons, ainsi que des moyens permettant de comparer les sons captés par au moins deux stations de détection locales.

7. Système selon la revendication 2, **caractérisé en ce que** les paramètres d'identification de véhicule, pour l'analyse comparative d'images capturées successivement par des stations de détection locales voisines, comprennent : les dimensions du véhicule ; les couleurs détectées ; la disposition de marques, d'inscriptions, etc. ; l'agencement des couleurs.

8. Système selon la revendication 5, **caractérisé en ce que** lesdits paramètres d'identification de véhicule comprennent en outre les bruits et les sons détectés par lesdits microphones.

9. Système selon au moins une des précédentes revendications, **caractérisé en ce qu'il** comprend des moyens destinés à calculer le nombre de véhicules en passage à des fins d'inspection du trafic et des temps de parcours relatifs.

10. Système selon au moins une des précédentes revendications, **caractérisé en ce qu'il** comprend

des moyens adaptés pour différencier les véhicules légers des véhicules lourds en fonction d'une ou plusieurs dimensions caractéristiques et des moyens adaptés pour compter les véhicules ainsi différenciés.

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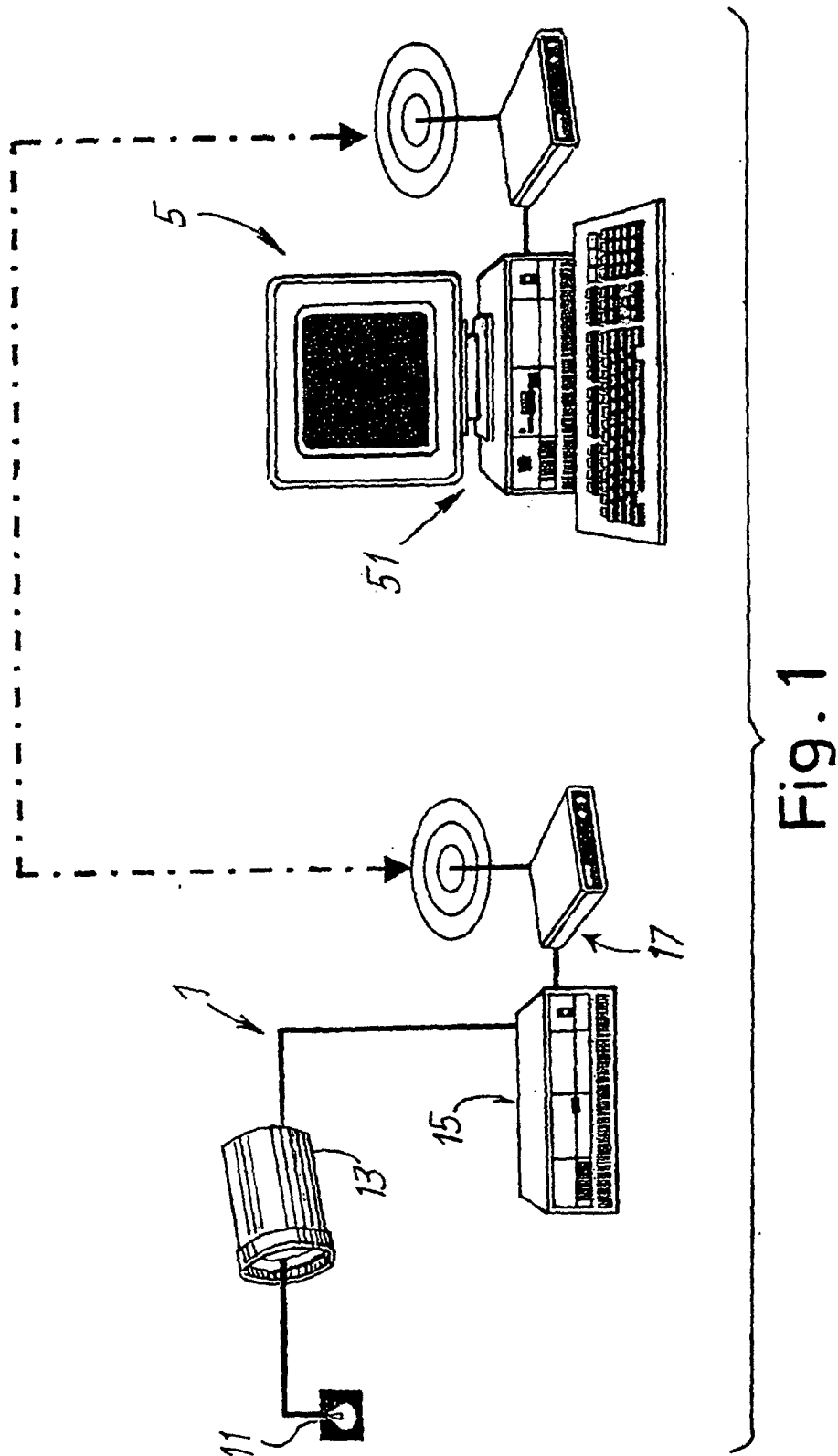


Fig. 2

