United States Patent

Demidov et al.

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[54] **AUTOMATIC DIAGNOSTIC STATION FOR AUTOMOBILES**

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June 20, 1969 U.S.S.R. 1343813
June 20, 1969 U.S.S.R. 1343819

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[51] **Int. Cl.**.....**G01m 15/00**

[58] **Field of Search**.....73/117.3, 117, 123, 347

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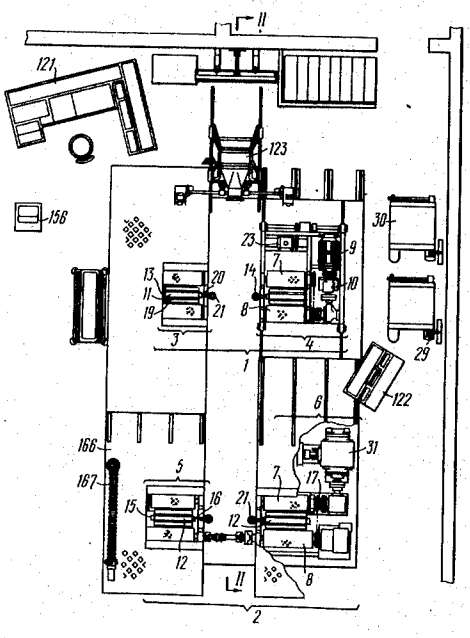
Attorney—Holman, Glascock, Downing & Seebold

[57] **ABSTRACT**

An automated diagnostic station for automobiles comprising all the necessary technical equipment for rapid and all-round examination of the automobile and for spotting the troubles.

5 Claims, 8 Drawing Figures



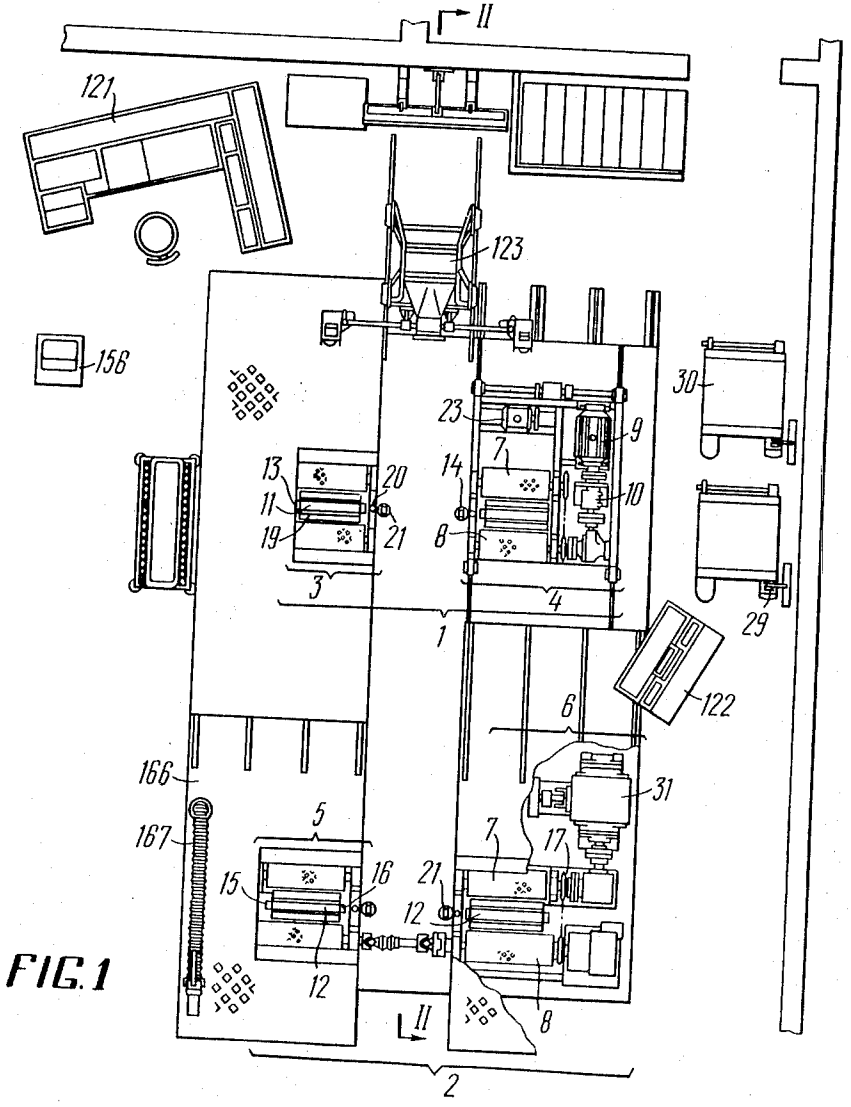

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FIG. 1

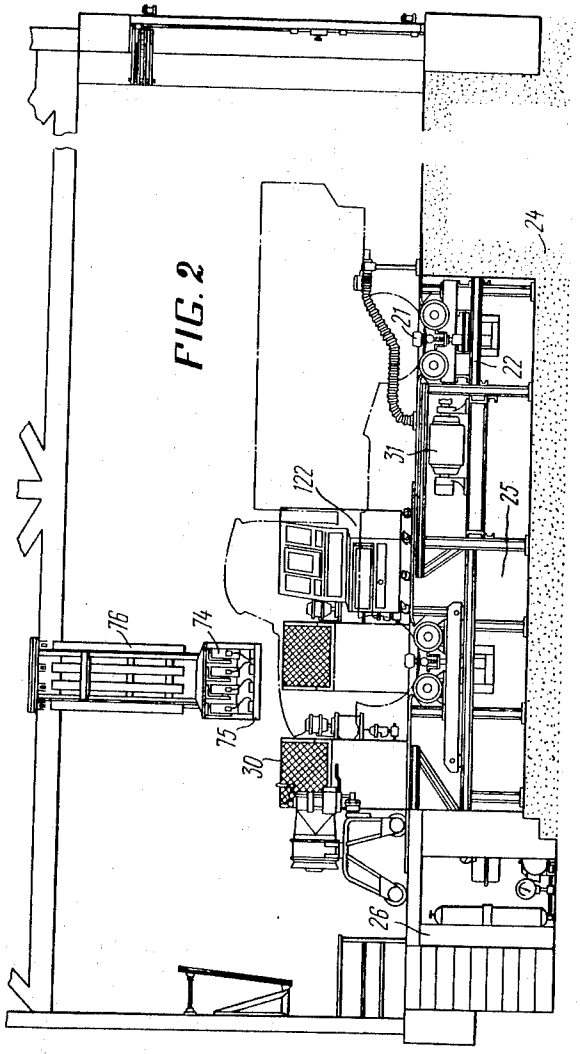

FIG. 2

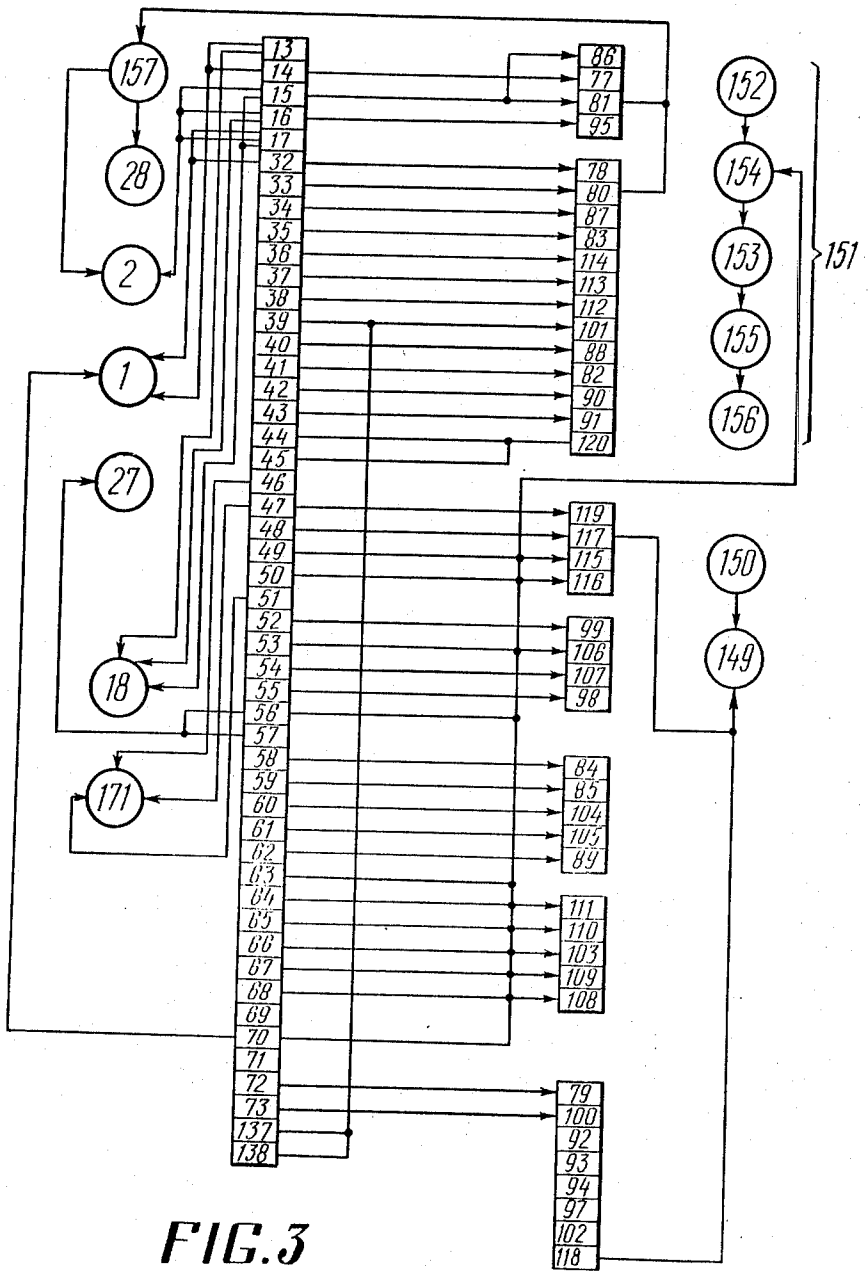
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FIG.3

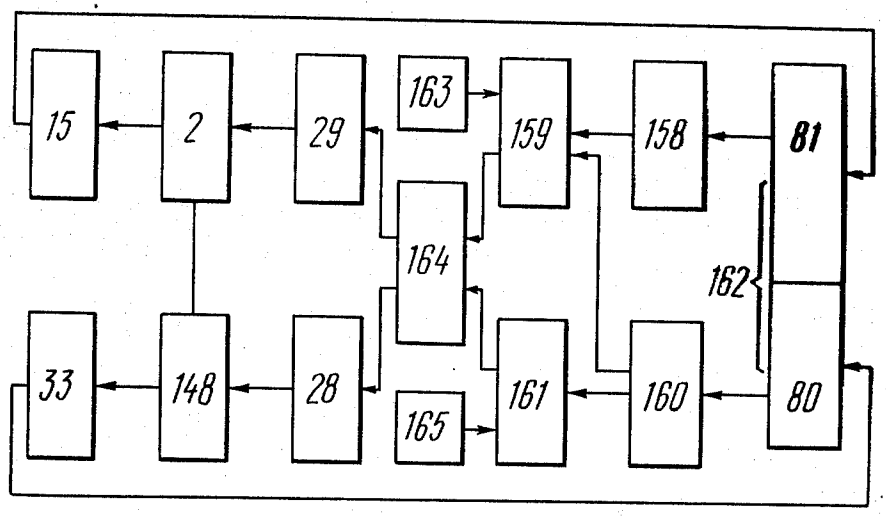
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FIG.4

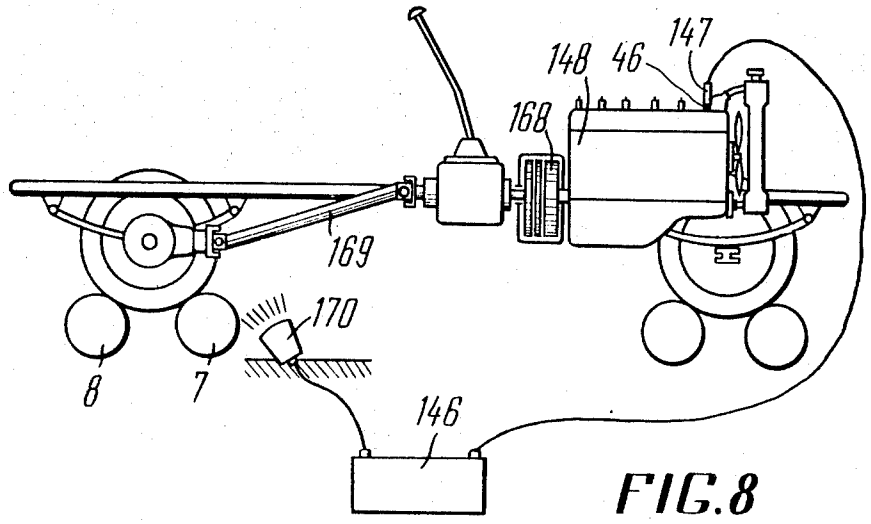
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FIG.8

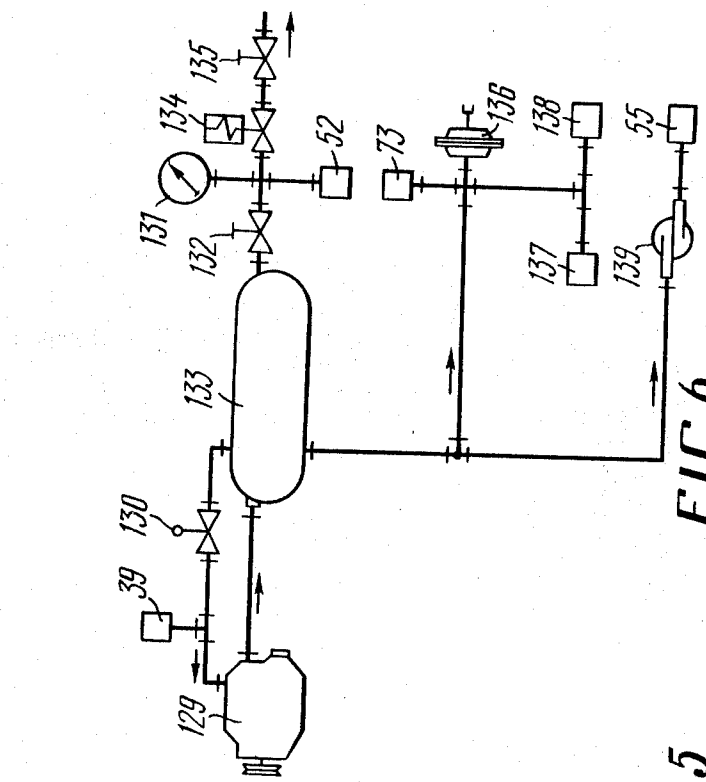
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FIG. 6

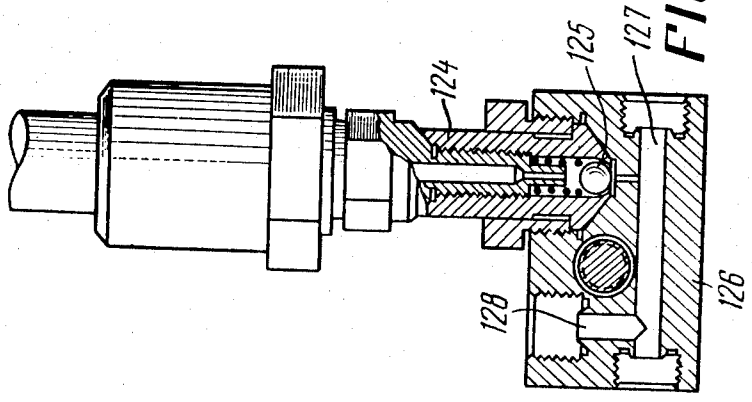
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FIG. 5

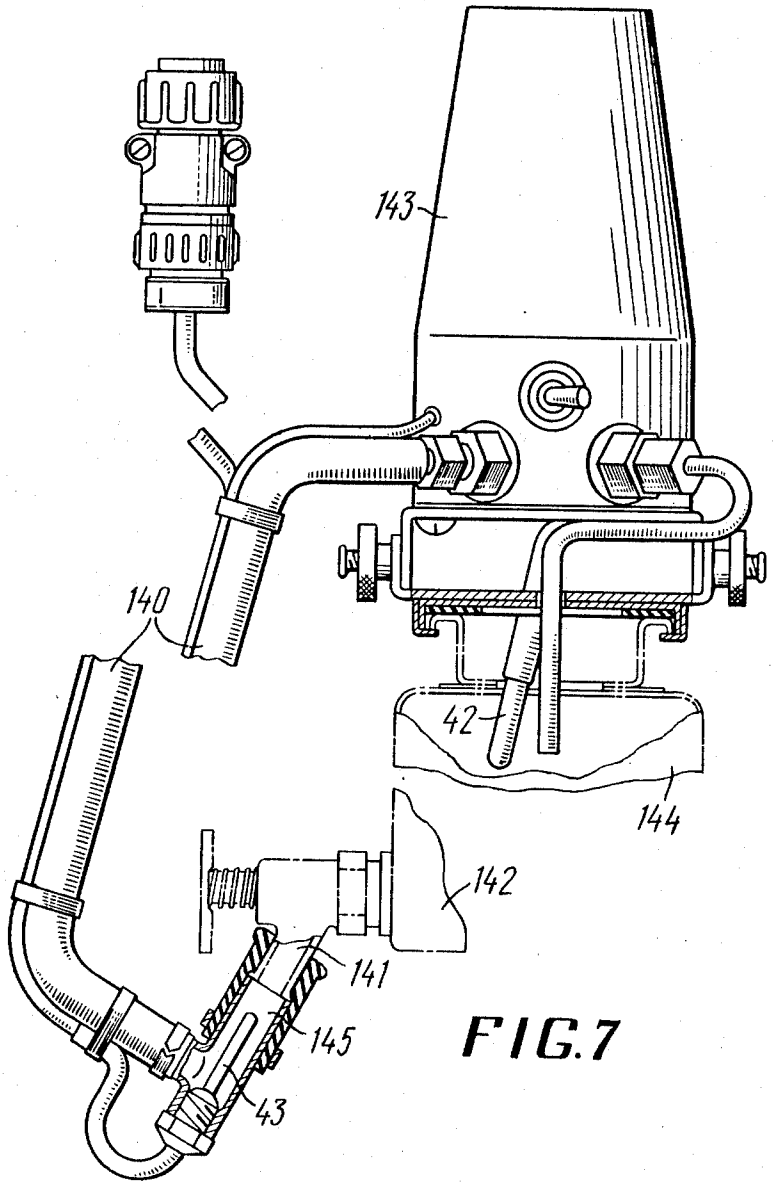

FIG. 7

AUTOMATIC DIAGNOSTIC STATION FOR AUTOMOBILES

The present invention relates to the automobile-building industry and, more specifically, it relates to the diagnostic stations for automobiles.

These stations are intended to determine the technical condition of automobiles by dianosing their troubles symptomized by the changes in their characteristics (without disassembling the automobile) with a view to establishing the scope of repairs and adjustments required.

Known in the art are diagnostic stations for automobiles comprising devices for activating individual units and mechanisms of the automobile, these devices consisting of dynamometer stands and actuating mechanisms, a control and measuring system comprised of pickups, measuring instruments and apparatus, and auxiliary devices.

The known stations are not adapted for spotting the troubles in the automobile brake systems, for checking the cooling system of the I.C. engines, for estimating the ignition system with sufficient accuracy in view of the absence of the automatic devices which could analyze the transient processes in the ignition system, for checking the panel-mounted instruments of the automobile jointly with their pickups without disconnecting their electrical circuits, for unit-by-unit checks of the power transmission mechanisms, for stabilizing automatically the operating conditions of the automobile units and mechanisms in the course of diagnosing, and are not capable of ensuring sufficient objectivity in making the diagnosis because identification of the troubles is entrusted to the operators.

An object of the invention resides in eliminating the disadvantages of the known diagnostic stations for automobiles.

A particular object of the invention is to provide a diagnostic station which would comprise all the technical means required for an all-round diagnosing of the condition of the automobiles.

This object is accomplished by providing an automated diagnostic station for automobiles comprising devices consisting of dynamometer stands and actuating mechanisms for activating the automobile units to be diagnosed, a control and measuring system and devices for maintaining the diagnosing conditions in which, according to the invention, the control and measuring system includes: a device for measuring the residual and service pressure in the hydraulic brake system comprising a pipe union with a non-return valve, said pipe union being connected with pickups of the residual and service pressure in the hydraulic brake system; a device for diagnosing the air brake system comprising pressure drop warning units and pressure pickups coupled to the air receiver, brake chambers and automobile-to-trailer air coupling and connected by a system of relays with electric stop-watches, pressure gauges and signal units; a device for measuring the temperature differential in the top and bottom tanks of the radiator, comprising a pipe communicating the top tank in which the temperature pickup is installed with the bottom tank, and a pump for transferring the coolant through a pipe from the bottom tank into the top tank, said pipe being provided with a built-in temperature pickup at the end connected to the bottom tank; a

device for determining the slipping of the clutch comprising a stroboscopic instrument connected to a pickup installed on the engine spark plug, the lamp of said stroboscopic instrument being aimed at the propeller shaft of the automobile.

This station is adapted for diagnosing the condition of automobiles both with the hydraulic and air brakes.

For determining the technical condition of the automobile electrical equipment it is practicable that the control and measuring system of the station should comprise a device with standard resistors connected to the pickups installed on the engine, said pickups being electrically connected with the panel-mounted instruments of the automobile.

To ensure objectivity of diagnosing, the station is equipped with a device for the input, processing and output of the diagnostic information, said device consisting of the parameter input panels, of the electrically inter-connected memory unit, a unit for processing and logical analysis of information, and of a commutator which interrogates the memory units and sends the signals of the identified troubles to a recording device.

To ensure automatic setting and stabilization of the parameter-measuring conditions which is indispensable for improving the accuracy of diagnosing, it is practicable that the station should comprise at least one unit for connecting the dynamometer stands with an electronic regulator which stabilizes the preset speed and load conditions of the dynamometer stands, and a unit for connecting the automobile engine with an electronic regulator which stabilizes the preset speed of said engine.

The units connecting the automobile mechanisms with the electronic regulators which stabilize the preset speeds of the engine and dynamometer stands are made in the form of a transformer which converts the pulse signals of the electronic tachometer into an analog signal fed to said electronic regulator which compares this analog signal with the signal of the diagnosing condition setter and energizes the mechanisms which actuate the automobile accelerator pedal and the electrodes of the liquid rheostat of the dynamometer stand motor.

Now the invention will be described in detail by way of example with reference to the accompanying drawings, in which:

FIG.1 is a top view of an automated diagnostic station for automobiles according to the invention;

FIG.2 shows the same station, section taken along line II—II in FIG. 1;

FIG.3 is a block diagram of the same station;

FIG.4 is a block diagram of the device for setting and stabilizing the operating conditions of the automobile and dynamometer stands;

FIG.5 shows a pipe union of the device for measuring the residual and service pressure in hydraulic brake system;

FIG.6 is a diagram of connections of the device for diagnosing the air brake system;

FIG.7 shows a device for measuring the difference of temperatures in the top and bottom tanks of the automobile radiator;

FIG.8 is a block diagram of the device for diagnosing the slipping of the clutch.

The diagnostic station for automobiles comprises the following basic components: a device for activating the automobile units and mechanisms being diagnosed; a control and measuring system; a device for automatic setting and stabilizing the diagnosing conditions; a device for input, processing and output of the diagnostic information.

The device for activating the units and mechanisms of the automobile includes a dynamometer power stand I (FIG.1), a dynamometer inertia stand 2 which, taken together, are capable of simulating the movement of the vehicle on the road.

The stand 1 is used to determine the condition of the front wheel brakes and measuring the reaction of the lateral forces of the some wheels.

The stand 2 is used to determine the condition of the automobile rear wheel brakes, trailer wheel brakes, and to load the automobile engine.

Each stand consists of two sections 3, 4, and 5, 6, respectively.

Each section 3, 4 and 5, 6 includes two drums 7, 8 installed under each wheel of the automobile.

The drums of each section 3, 4 are rotated by electromechanical drives 9. The speed reducer 10 of each drive 9 of the power stand 1 is of the two-speed type to provide a low rotation speed of the drums for diagnosing the brakes and a high speed of said drums for measuring the reaction of the lateral forces of the front wheels.

Installed between the race drums 7 and 8 in each section 3, 4 and 5, 6 of the stands 1 and 2 are measuring rollers 11 and 12.

The rollers 11 are connected with the front wheel speed pickup 13 and the lateral force reaction pickup 14. The roller 11 is designed and installed so that it can rotate while contacting the wheel and, additionally, move laterally through a distance proportionate to the lateral force of the wheel.

Connected to the roller 12 of the sections 5, 6 of inertia stand 2 is the rear wheel speed pickup 15 and the pickup 16 measuring the deceleration of the same wheels. Connected with one of the race drums of each section 3, 4 and 5, 6 of both stands is the rotation speed pickup 17 which, jointly with one of the pickups 13 and 13 of the measuring roller 11 and 12, is connected to the system 18 (FIG. 3) which gives information on the slipping of the automobile wheel on the race drums 7 and 8 (FIG.1) and disconnects the drives of the stands 1, 2 when slipping becomes critical.

For driving the automobile on and off the stands 1 and 2 there are wheel lifts 19 located between the drums 7, 8 of each section 3, 4 and 5, 6 of the stands I, 2.

To ensure safe operation and to provide for the required diagnosing conditions which would exclude the sidewise skidding of the automobile, the stands 1, 2 are equipped with guard rollers 20 (FIG.1) which are spaced so that the distance between the guard rollers of one and the same stand is equal to the inner track of the automobile wheels.

The stands 1 and 2 are equipped with hydraulic lifts 21 (FIGS. 1, 2) for lifting the automobile by its axles.

The inertia stand 2 is mounted immovably on the metal structure 22 whereas the power stand 1 can be moved by the electromechanical drive 23 (FIG. 1) for positioning it under the front wheels of automobiles with different wheel bases.

In addition, free movement of the stand 1 makes it possible to determine the misalignment of the automobile front axle when the rear wheels are fixed on the race drums of the inertia stand 2.

The metal structure 22 on which stands 1 and 2 are mounted, is installed on a foundation 24 (FIG.2) in the foundation pit 25 entrance into which is through an underground tunnel 26.

The device for activating the units to be diagnosed comprises the following actuating mechanisms: a mechanism 27 (FIG.3) for pressing the brake pedal with a preset force and speed, a mechanism 28 (FIGS. 3, 4) for actuating the accelerator pedal, a mechanism 29 (FIGS. 1, 4) for actuating the electrodes of the liquid rheostats 30 (FIGS. 1, 2) and the electric motor 31 (FIG. 1) driving the drums 7, 8 of the dynamometer stand 2. The control and measuring system includes, apart from the above-mentioned pickups 13, 14, 15, 16 and 17, pickup 32 (FIG.3) of the front wheel torque, pickup 33 (FIGS. 3, 4) of the engine crankshaft speed, pickup 34 (FIGS. 3, 4) showing the blow-by of gases into the engine crankcase, oil pressure pickup 35, pickup 36 showing the leakage of air through engine valves, pickup 37 registering the leaks of air through the cylinder-and-piston groups of the engine, pickup 38 indicating the carbon dioxide content in the exhaust gases, pickup 39 (FIGS. 3, 6) indicating the air pressure in the compressor, pick up 40 (FIG.3) registering the depression in the inlet manifold, oil temperature pickup 41, water temperature pickup 42 (FIGS. 3, 7) in the radiator top tank and a water temperature pickup 43 in the radiator bottom tank, pickup 44 (FIG. 3) indicating the noises in the automobile engine, pickup 45 registering the knocking in the engine valve gear, pickup 46 (FIGS. 3, 8) installed on the cylinder spark plug, pickup 47 of the secondary voltage in the ignition system, pickup 48 (FIG. 3 of the current drawn by the starter, pickup 49 of the luminous intensity of the headlamps, pickup 50 showing the position of the headlamp beam in space, pickup 51 indicating the top dead center of the engine piston, pickup 52 (FIGS. 3, 6) indicating the air pressure in the automobile pneumatic system, pickup 53 (FIG.3) of the brake pedal free travel and pickup 54 of the clutch pedal free travel, pickup 55 (FIGS. 3, 6) registering pressure in the automobile-to-trailer air coupling, pickup 56 of the brake pedal residual travel, pickup 57 of the beginning of braking of automobile brakes, fuel consumption pickup 58, fuel pressure pickup 59, pickups 60 and 61 of the residual and service pressure in the hydraulic brake system, pickup 62 registering the vacuum before the hydrovacuum booster, pickup 63 of the brake chamber rod travel, pickup 64 indicating the angular play of the propeller shaft, pickup 65 of the angular play of the gear box main shaft, pickup 66 of the clearances in the king pin joints, pickup 67 of the angular play of the rear axle drive shaft, pickup 68 of the steering wheel play, pickup 69 of the force at the steering wheel rim, pickup 70 of front wheel misalignment, pickup 71 of the position of liquid rheostat electrodes, pickup 72 of the torque moment on the automobile rear wheels, and pickup 73 (FIGS. 3, 6) of the pressure in the automobile brake chambers.

To increase the efficiency and convenience of operators, work and to reduce the diagnostic time, all the pickups are located in close proximity to the points of their connection. The pickups connected to the automobile engine units are secured at the ends of the cables wound on selfreeling drums **74** (FIG.2). When out of service, these pickups are stored on shelves **75** left and right of the engine, said shelves being secured on suspension **76**.

The control and measuring system includes the following measuring instruments: indicator **77** (FIG.3) of the lateral forces of the automobile wheels, indicator **78** of the torque moment on the automobile front wheels, indicator **79** of the rear wheel torque, indicator **80** (FIGS.3, 4) of engine crankshaft speed, indicator **81** of the automobile wheel speed, indicator **82** (FIG.3) of engine oil temperature, indicator **83** of engine oil pressure, indicator **84** of fuel consumption, indicator **85** of fuel pressure in engine fuel system, indicator **86** of braking distance, indicator **87** of crankcase blow-by gases, indicator **88** of vacuum in the engine inlet manifold, indicator **89** of vacuum before hydrovacuum booster, indicator **90** of water temperature in radiator top tank, indicator **91** of water temperature in radiator bottom tank, indicator **92** of voltage frequency in the supply system of the dianogstic station, indicator **93** of voltage in the station supply source, indicator **94** of pressure in the station pneumatic system, indicator **95** of the response time of the air brake system, indicator **97** of the release time of the air brake system, indicator **98** of pressure in the automobile-to-trailer air coupling, indicator **99** of pressure in the receiver of the automobile brake system, indicator **100** of pressure in the automobile brake chambers indicator **101** of compressor output, indicator **102** of pressure in the station hydraulic system, indicator **103** of clearances in king pin joints, indicator **104** of residual pressure in the hydraulic brake system indicator **105** of service pressure in the hydraulic brake system, indicator **106** of brake pedal free travel, indicator **107** of clutch pedal free travel, indicator **108** of steering wheel play, indicator **109** of total clearance in automobile final drive, indicator **110** of total clearance in gearbox gears, indicator **111** of angular play of automobile propeller shaft, indicator **112** of carbon dioxide content in exhaust gases, indicator **113** of air leaks through engine piston-and-cylinder group, indicator **114** of air leaks through engine valves, indicator **115** of luminous intensity of automobile headlamps, indicator **116** of the position of headlamp beam in space, ammeter **117**, voltmeter **118**, and oscillograph **119**.

The indicating instruments listed above are installed on the main control desk **121** (FIG.1), roll-up control desk **122** (FIG.2), and on the device **123** (FIG.1) for diagnosing the headlamps and blowing the engine.

The control and measuring system comprises also a device for measuring the residual and service pressure in the hydraulic brake system, said device consisting of a pipe union **124** (FIG.5) with a non-return valve **125**, connected with the pickups **60** and **61** of the residual and service pressures in the hydraulic brake system.

The pipe union **124** is connected through the non-return valve **125** to the brake lines of the automobile. For convenience of connections the automobile is fitted with a Tee-pipe **126** having a socket for connecting the pipe union **124**. This socket is in communication with the channel **127** of the Tee-pipe **126**. The channel **127** communicates with the automobile wheel brake cylinders, while the channel **128** communicate brake master cylinder.

The control and measuring system also includes a device for diagnosing the air brake system comprising a pickup **39** of pressure in the compressor, said pickup being cut in between the automobile compressor **129** (FIG.6) and the pressure regulator **130**, an electric-contact pressure gauge **131** and a pickup **52** of pressure in the automobile air system connected to the cock **132** for taking off air from the receiver **133**, an electromagnetic valve **134** and a throttle **135** communicating the receiver **133** with the atmosphere, a pickup **74** of pressure in the automobile brake chambers **136** and pressure warning units **137** and **138** connected to one of the brake chambers **136**, and a pressure pickup **55** connected to the automobile-to-trailer air coupling **139**. The pickup **39** is connected with the indicator **101**, the pickup **52** with the indicators **99** and **97**, the pickup **73** with the indicator **100**, and the pickup **55** with the indicator **98**.

Said pickups of the device for diagnosing the air brake system are connected to the corresponding indicators through a system of relays and limit switches.

The control and measuring system also includes a device for measuring the difference of temperatures in the top and bottom radiator tanks of the automobile, this device comprising: a pipe **140** (FIG.7) one end of which is connected to the drain cock **141** of the radiator bottom tank **142** while its other end is connected via the pump **143** with the radiator top tank **144**, a pickup **42** installed in the top tank **144** and a pickup **143** installed in a special container **145** of the pipe **140**. The pickup **42** is connected with the indicator **90**, and the pickup **43** with the indicator **91** (FIG.3). The pump **143** (FIG.7) transfers the coolant from the bottom tank into the top tank through the pipe **140**.

The control and measuring system also includes a device for determining the slipping of the clutch, said device comprising a stroboscopic instrument **146** (FIG.8) connected with the pickup **46** which is installed on the spark plug **147** of the automobile engine **148**.

The control and measuring system also includes a device **149** (FIG.3) for diagnosing the electrical equipment, said device comprising an ammeter **117**, a voltmeter **118**, a system (not shown in the drawing) controlling the functioning of said device **149**, standard resistors **150** connected to the pickups installed on the engine **148** and connected electrically with the panel-mounted instruments of the automobile.

To ensure objectivity of diagnosing, the station is equipped with a device **151** (FIG.3) for input, processing and output of diagnostic information consisting of parameter input panels **152**, of electrically interconnected memory units **153**, a unit **154** for processing and logical analysis of information and a commutator **155** which interrogates the memory units **153** and sends the signals of the identified troubles to the recording devices **156**.

Automatic setting and stabilization of the parameter-measuring conditions is ensured by a device **157** including a unit **158** (FIG.4) connecting the dynamome-

ter stands with the electronic regulator **159** which stabilizes the preset speed and load conditions of the dynamometer stand **2**, and a unit **160** connecting the automobile engine **148** with the electronic regulator **161** which stabilizes the preset speed of the automobile engine.

The connection unit **158** is made in the form of a transformer which converts the pulse signals sent by the electronic tachometer **162**, (said signals being proportionate to the rotation speed of the drums **7** and **8** of the dynamometer stand **2**) into an analog signal which is fed to one of the inputs of the electronic regulator **159** the other input of said regulator receiving signals from the setter **163** of the rotation speed and load. The output of the electronic regulator **159** is connected via actuating relays **144** with the actuating mechanism **29** of the liquid rheostat electrodes. For setting and stabilizing the loading conditions of the dynamometer stand **2** the input of the electronic regulator **159** is connected with the connection unit **160** while the output of the same electronic regulator **159** is connected by actuating relays **164** with the actuating mechanism **29** of the liquid rheostat electrodes.

The connection unit **160** is a transformer which converts the pulse signals sent by the electronic tachometer **162**, (said signals being proportionate to the crankshaft speed of the engine **148**), into an analog signal which is fed to one of the inputs of the electronic regulator **161**, its other input receiving a signal from the crankshaft speed setter **165**. From the output of the electronic regulator **161**, the signal is fed through the actuating relays **164** to the actuating mechanism **28** of the automobile pedal.

After inspecting the automobile units whose examination with the aid of special instruments is impractical and after readying the automobile for diagnosing by measuring the type pressure and bringing it to the normal level, checking the engine drive belt tension, the clutch free travel and, in winter, raising the oil temperature in the engine mechanisms to the required level, the automobile is taken to the diagnostic station.

The diagnostic station is manned by three operators. For the sake of simplicity, in describing the diagnosing process the operators will be called "first," "second" and "third" operators. The first operator working at the control desk **121** prepares the instruments for diagnosing the automobile, checks the service characteristics of the diagnostic station systems by the instruments **92, 93, 94** and **102** and adjusts the sections of the front movable stand **1** to suit the wheel base of the automobile. Meanwhile, the second operator opens the gates of the diagnosing bay of the station and the third operator drives the automobile from the inspection bay over the ramps **166** (FIG.1) onto the stands **1** and **2** so as to position the automobile wheels on the wheel lifts **19**. Then the first operator feeds the automobile data (make, number, speedometer readings, etc.) and the date of diagnosing into the memory unit **153** of the device **151**. The second operator connects the exhaust gas drawout pipe **167** to the automobile, the first operator lowers the wheel lifts **19** so that the front and rear wheels of the automobile come down on the drums **7** and **8** of the stands **1** and **2**. While the wheels are being lowered on the drums, the sections **3** and **4** of the front sand are moved forward or backward by the weight of the automobile thus being adjusted to the relative positions of the automobile axles. If the axles are misaligned, the pickups **70** installed on the movable sections of the stand **1** send a misalignment signal to the memory unit **153** of the device **151**. After complete lowering of the wheel lifts **19**, the sections **3** and **4** of the stand **1** are automatically locked.

The first and second operators install the following pickups on the automobile engine: fuel consumption pickup **58**, fuel pressure pickup **59**, oil temperature pickup **41**, device for measuring the temperature differential in the top and bottom radiator tanks **144** and **142**, pickup **46** on the spark plug on No **1** cylinder of the engine **148**, secondary voltage pickup **47** in the ignition system, startor draw current pickup **48**, piston top dead center pickup **51**, inlet manifold or valution pickup **40**, crankshaft speed pickup **33**, oil pressure pickup **35**, crankcase blow-by gases pickup **34**; then they connect the cable clips to the elements of the automobile electrical equipment. In case of an automobile with air brakes, the third operator installs pickups **39, 52, 73, 137, 55** and warning unit **138** of the device for diagnosing air brake system, as described above, and pickups **63** of brake chamber rod travel.

In case of an automobile with hydraulic brakes, the same operator installs the pickups **60, 61** of the device for measuring the residual and service pressures in the hydraulic brake system of the automobile, as described above, and a pickup **62** of depression before the brake hydrovacuum booster.

The third operator stationed underneath the automobile installs the pickups **66** of clearances in the king pin joints. When the automobile front axle is lifted by lifts **21** and lowered (the lifts are controlled by the first operator from the main control desk **121**) any deviations of the clearances from the rated values are automatically indicated by a signal fed into the unit **154** for processing and logical analysis of the diagnostic information.

Then the third operator installs the propeller shaft angular play pickup **64**, the gearbox main shaft angular play pickup **65**, the rear axle drive shaft angular play pickup **67** and, assisted by the first operator who actuates the automobile hand brake and shifts the gearbox gears, measures the angular clearances in the rear axle final drive, propeller shaft and gearbox. If the clearances are other than normal, this is indicated automatically by a signal sent to the unit **154** for processing and logical analysis of information. After measuring the above-mentioned parameters, the pickups **66, 64, 65** and **67** are removed from the automobile. After the installation of the pickups on the automobile engine **148**, the first operator rolls up and puts in position the device **123** for diagnosing the headlamps, said device comprising the luminous intensity pickups **49**, the pickup **50** of the position of light beam in space, and indicators **115** and **116**. If the measured parameters are other than normal, this is automatically indicated by signals fed into the unit **154** for processing and logical analysis of information. Then the first operator uses the device **149** for diagnosing the electrical equipment, measures the parameters of the automobile storage battery, pickups and instruments on the instrument panel. If the values of the measured parameters are other than normal, the first operator presses the corresponding

buttons of the information input panel **152**. The third operator sitting in the automobile cab measures the parameters of the clutch and brake control linkages and of the steering gear with the aid of steering wheel play pickup **68**, pickup **69** of the force at the steering wheel rim, brake pedal free travel pickup **53** and clutch pedal free travel pickup **54**. If the measured parameters differ from the normal values, the signals will be automatically fed into the unit **154**. The third operator installs the brake pedal actuating mechanism **27** into the cab and, assisted by the first operator stationed at the control desk **121**, makes a diagnosis of the automobile brake systems; for this purpose, the first operator switches on the device **157** for operation under the conditions of automatic setting and stabilization of brake diagnosing and sets the operating duty of the dynamometer stands **1** and **2**. Then the first operator switches on the mechanism **27** actuating the brake pedal and measures the parameters of the automobile brake system. If these parameters are other than normal, the first operator working at the control desk **152**, feeds the signals into the unit **154**. In the same way, the first and third operators made a diagnosis of the automobile parking brake for which purpose a different operating duty is set and maintained on the dynamometer stand **2**.

During operation of the stand **1**, the operators diagnose the steerable wheels of the automobile with the aid of the measuring roller **11** and the pickups **14** of the reaction of the wheel lateral forces.

Then the third operator removes the brake pedal actuating mechanism **27** from the cab and installs the accelerator pedal actuating mechanism **28** instead. The first and second operators make a diagnosis of the performance of the automobile engine **148**.

The first operator stationed at the control desk **121** sets the required operating conditions of the stand **2** and engine **148**, ranging from no-load to full-load operation; meanwhile, the second operator works at the roll-up desk **122**, measuring and recording the diagnosed parameters on the parameter input panel **152**; the first operator, working at the main control desk **121**, measures the parameters and, if they are other than normal, feeds the corresponding signals from the parameter input panel **152** into the unit **154**. During this operation, the electrical, ignition, fuel supply, cooling and lubricating systems are diagnosed as well as the crank and valve gears of the engine. Using a special device, the first operator determines the degree of slipping of the clutch **168** at a full-load of the engine **148**; in so doing, he watches the effect of immobility of the propeller shaft joint cross, the latter being illuminated by a pulse flashing lamp **170** whose flashing frequency is equal to the crankshaft rotation speed of the engine **148**; the flashing lamp **170** is secured on the metal structure of the stand **2**. The second operator measures the carbon dioxide content in the exhaust gases and listens to the operating noises in the engine, gearbox and the rear axle final drive with the aid of the electronic stethoscope **120**.

The engine ignition system is diagnosed with the aid of the device **171** (FIG.3) which analyses the transient process in the functioning ignition system and is actuated by the piston TDC pickups **51**, secondary voltage pickup **47** and the pickup **46** installed on the spark plug.

Having diagnosed the engine **148**, the first and second operators feed the signals indicating the deviations of the measured parameters from normal values from the panel **152** into the unit **154** for processing and logical analysis of information.

This completes the diagnosing cycle.

In the process of diagnosing, the unit **154** for processing and logical analysis of information analyses the data fed in by the operators and stores the results in the memory unit **153**.

At the end of the cycle, the diagnosis is automatically issued by the recording device **156**.

The process of all-round diagnosing of one automobile takes not more than 45 minutes.

What is claimed is:

1. An automatic station for all-round diagnosing of the technical conditions of automobiles, comprising dynamometer stands; rotatable race drums on said stands, on which drums the wheels of the automobile being diagnosed are supported; electric motors with liquid rheostats in each of said stands for driving and braking said race drums; a control panel of said station; indicating and recording instruments on said control panel; actuating means electrically connected with said control panel and serving in conjunction with said dynamometer stands for bringing into operative condition the units and components of the automobiles being diagnosed; a control and measuring system comprising means for measuring the residual and service pressure in the hydraulic brake system of the automobiles; in said means for measuring the residual and service pressure, pickups for the residual and service pressure and a pipe union with a non-return valve connected to the brake pipeline of the automobile and to said pickups for the residual and service pressure, and further means included in said control and measuring system for individual diagnosing of the air brake system of the automobile; warning devices and pickups of said means for diagnosing the air brake system connected to a receiver, brake chambers and an automobile-to-trailer coupling member of the same automobile; electric stop-watches, pressure indicators and warning devices of said means for diagnosing the air brake system of automobiles mounted on said control panel and connected by means of relays to said warning device and pressure pickups; means included in said control and measuring system for measuring the temperature difference between the top and bottom tanks of the radiator of the automobile; a pipeline in said means for measuring the temperature difference serving for connecting said top tank, in which a temperature pickup is arranged, with aid bottom tank of the radiator; a pump in said means for measuring the temperature difference serving to circulate liquid in said pipeline from said bottom tank to said top tank of the radiator; a temperature pickup built in said pipeline at the end of said pipeline which is connected to said bottom tank; means included in said control and measuring system for determining slipping of the automobile clutch, including a stroboscopic device mounted on one of said dynamometer stands; a pickup of the same means mounted on an ignition plug of the engine of the automobile being diagnosed and electrically connected with said stroboscopic device; a lamp of said stroboscopic device directed onto the propeller shaft of the automobile being diagnosed; means for maintaining the

diagnosing conditions, comprising electronic regulators comparing predetermined signals from said control panel with the electric signals of the pickups mounted on said dynamometer stands and engine of the automobile, transmitted via electrical coupling units, said means for maintaining the diagnosing conditions being electrically connected with said actuating means.

2. An automatic station as claimed in claim 1, wherein aid control and measuring system includes means for diagnosing the electric appliances of automobiles, comprising standard resistors connected to pickups mounted on the engine of the automobile being diagnosed and electrically connected with the panel-mounted recording instruments of the automobile, said standard resistors being adapted to simulate the operating conditions of pickups and indicators of the panel-mounted instruments of an automobile when the engine is not operating for detecting faults in said pickups and indicators.

3. An automatic station as claimed in claim 1, wherein means are provided for introducing, processing and delivering diagnostic information, said means comprising electrically connected panels for parameter input, memory units, a logic unit for analyzing the information and a commutator interrogating said memory units and delivering signals of detected faults to the recording means of said control panel.

4. An automatic station as claimed in claim 1, wherein an electronic regulator is provided to maintain the preset speed and load conditions of said dynamometric stands, which regulator is electrically connected with said stands by at least one connection unit, and another electronic regulator included in said station for maintaining a preset speed of the automobile engine and electrically connected therewith by a second connection unit.

5. An automatic station as claimed in claim 1, wherein said connection units between the dynamometric stands and the automobile engine and said electronic regulators maintaining the preset speed of said dynamometer stands and said engine comprise converters converting the pulse signals derived from said pickup of the engine ignition plug via an electronic tachometer of said control panel and from the pickups of said dynamometer stands into an analog signal which is applied to said electronic regulators comparing the signals received with the signals from the condition setting devices of said control panel and operating said actuating means of the accelerator pedal and of the electrodes of said liquid rheostats of the electric motors of said dynamometer stands.

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