April 18, 1939. C. F. SMITH 2,154,642

FIRE ENGINE

Original Filed Nov. 2, 1935 4 Sheets-Sheet 1

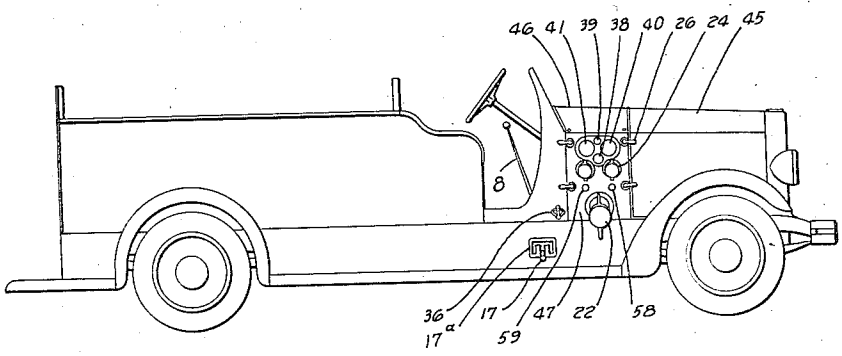



Fig. 1

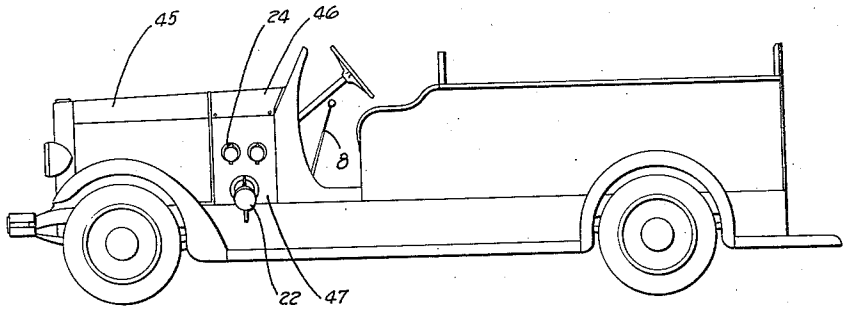



Fig. 2

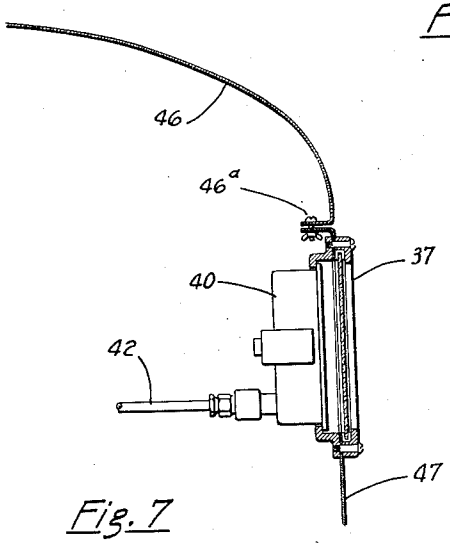



Fig. 7

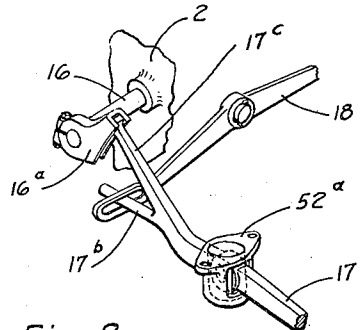



Fig. 8

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FIRE ENGINE

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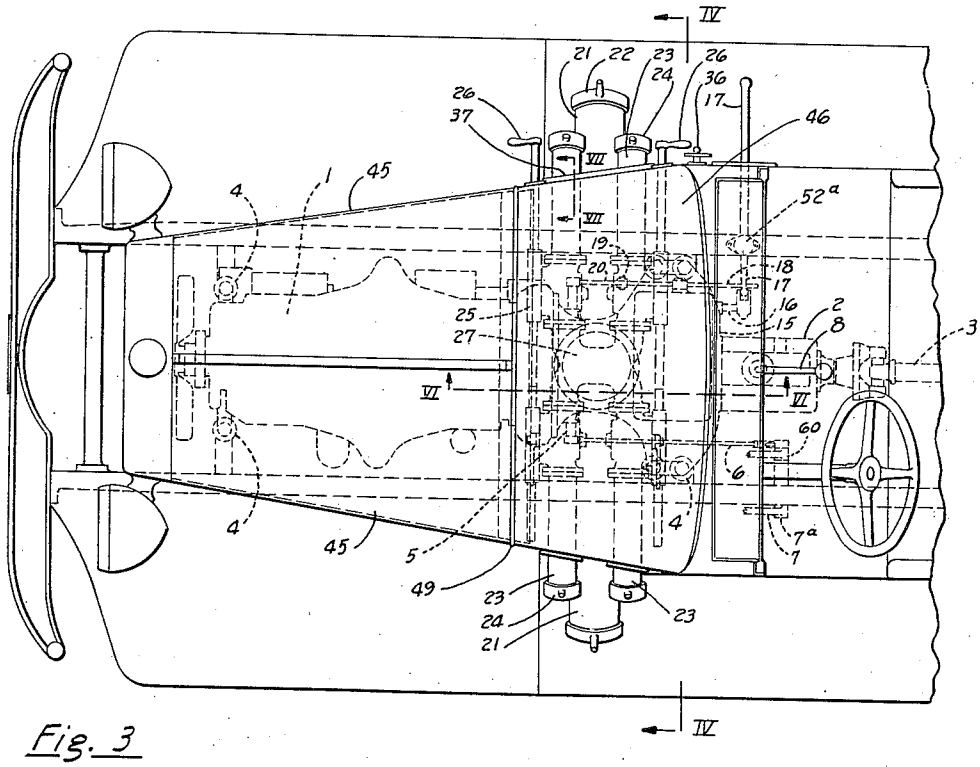



Fig. 3

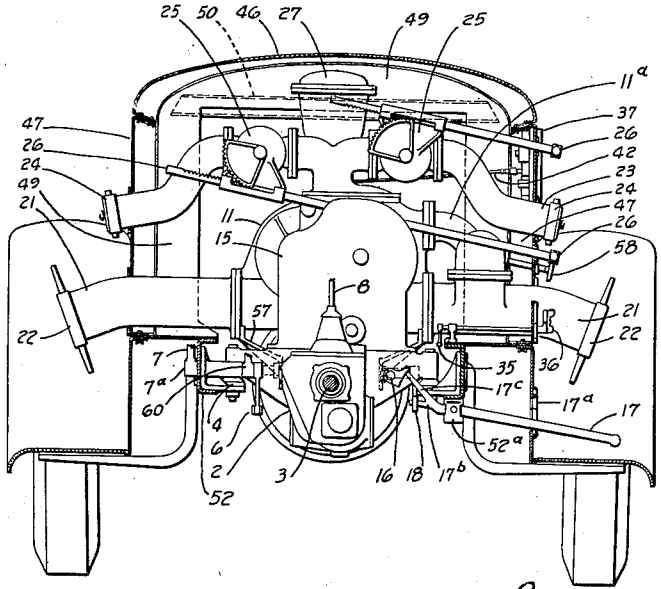



Fig. 4

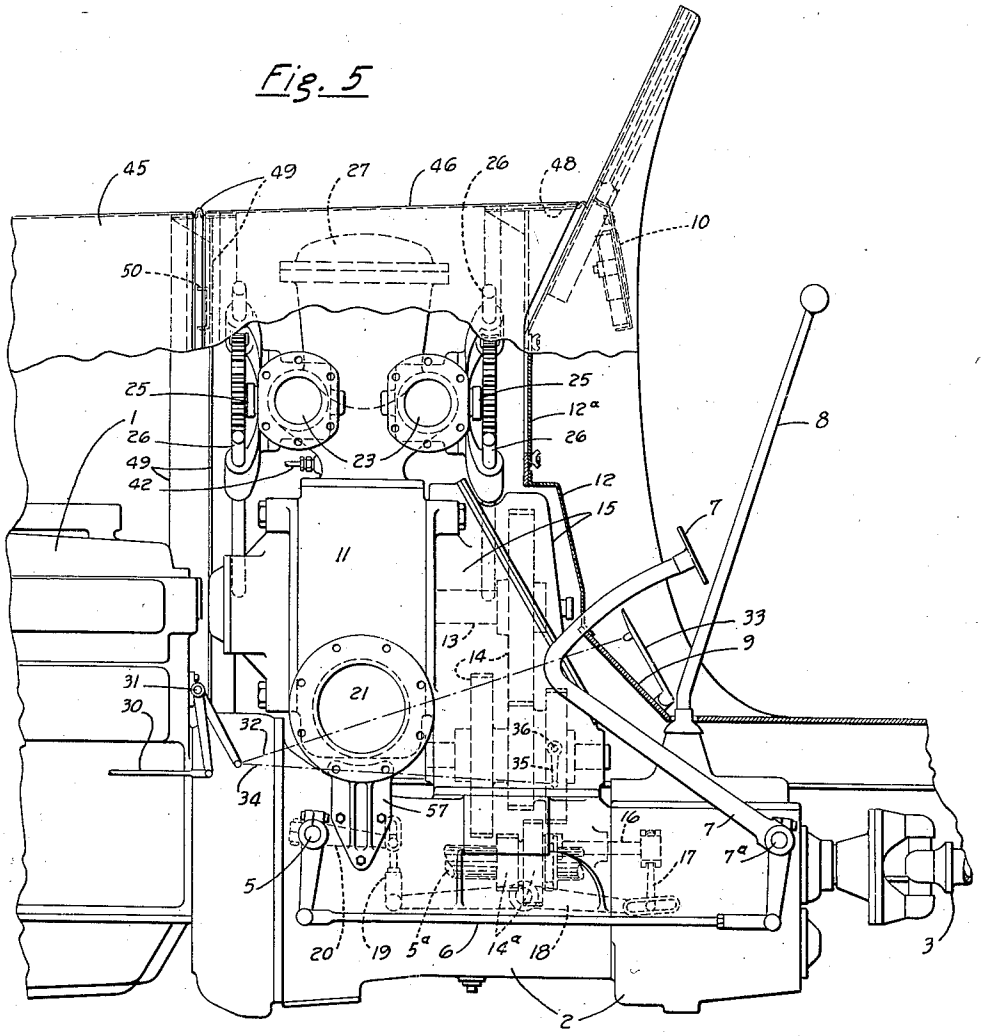
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Fig. 5



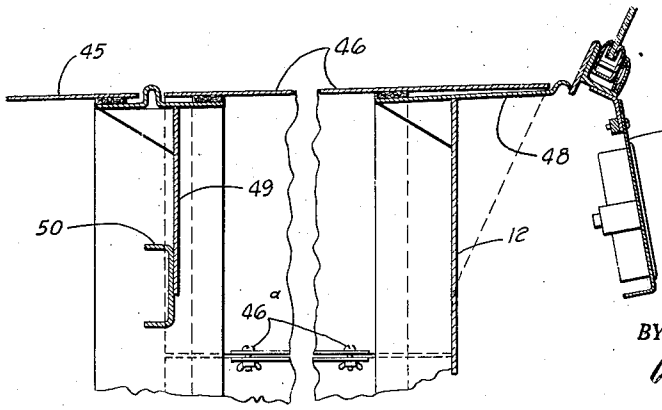




Fig. 6

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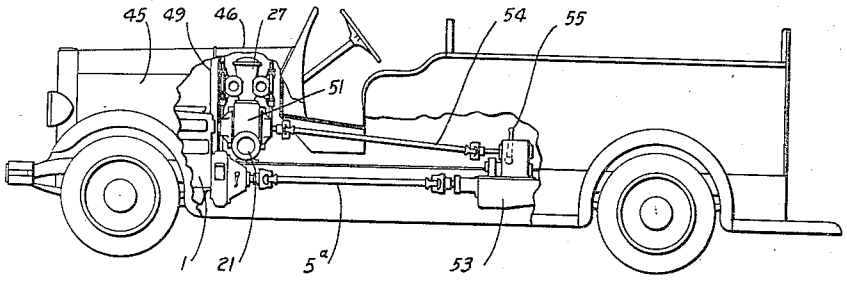



Fig. 9

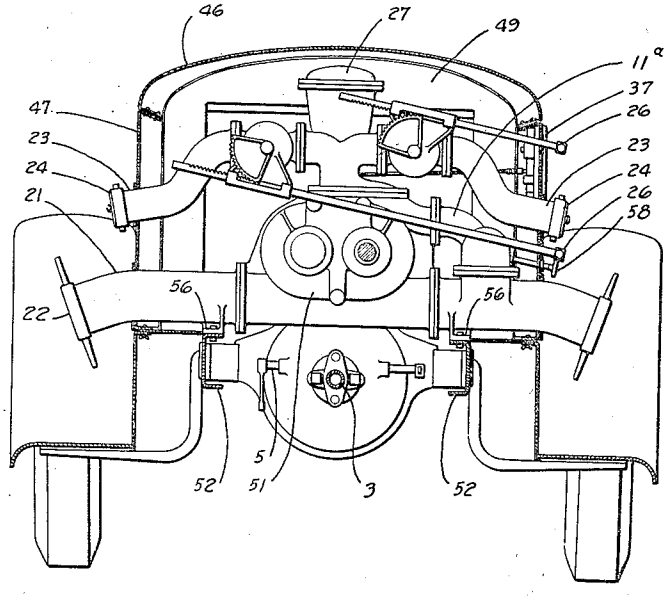



Fig. 10

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Patented Apr. 18, 1939 2,154,642

# UNITED STATES PATENT OFFICE

2,154,642

## FIRE ENGINE

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Application November 2, 1935, Serial No. 47,952
Renewed September 13, 1938

2 Claims. (Cl. 169—24)

The invention relates to automobile fire engines or motor pumpers and the object is to improve the reliability and the convenience of use of such machines as well as to give them an improved and smarter appearance.

This and related objects are accomplished by a new principle of assembly of the vehicle chassis and the propelling engine and the fire-pump driven by it, and by various adjunctive features of construction and arrangement, as will be more fully understood in connection with an exemplary form of the invention depicted in the accompanying drawings wherein

Fig. 1 is a side elevation of the new pumper in its preferred form;

Fig. 2 the opposite elevation;

Fig. 3 a top plan of the forward part;

Fig. 4 a section on line IV—IV of Fig. 3 in the direction of the arrows;

Fig. 5 a side elevation with parts broken away to show the pump and transmission case;

Fig. 6 a detail section on line VI—VI of Fig. 3;

Fig. 7 is a detail section of the instrument panel and its mounting on line VII—VII of Fig. 3;

Fig. 8 is a detail;

Fig. 9 is a side elevation of a modified form, and

Fig. 10 a cross-section thereof similar to Fig. 4.

The pumper comprises a vehicle frame, spring-supported on front and rear road wheels, and a combustion engine power plant connectable for driving either the road wheels or the fire-pump as customary in motor pumpers.

The engine is marked 1, being in the present case a V-type engine with duplicated fuel and exhaust systems on its opposite sides, indicated by the dotted lines, but any other type of combustion engine is suitable and the engine shown will be understood as provided with all such usual accessories as starting motor, generator, water-circulating and oil pumps, etc., none of which is shown because unimportant to the invention, but which can of course be arranged and located, as usual.

According to this invention the engine and the fire-pump are mounted both forward of the vehicle body or driver's seat, one behind the other, preferably with the pump behind the engine cylinder block and both are enclosed in the same forward cowling structure, so that they are virtually in one compartment. In this relation several practical advantages are attained over pumper organizations as heretofore constructed, as will be presently explained; it being noted here that the forward position of the heavy mass of the pump is found to improve the handling, and hence the safety, of the vehicle at speed while the proximity of the pump to the heat of the engine safeguards it against damage from freezing during the run to or from the fire and during stand-by periods, besides which the pump and its drive and valve mechanism work better and with less power losses in the warm atmosphere inside the cowling structure and the water gauges and other indicator devices, no longer have to be frequently drained of water and are removed from any possibility of injury or of erratic indication as the effect of the stoppage of their connection tubes with ice crystals. The engine has the usual radiator and the usual fan behind it which directs its blast of heated air toward the rear of the cowled-in space and ensures the effective distribution of the heat.

The engine is mounted on the chassis frame in the usual way, as by means of four cushion mountings indicated at 4. Its power transmission line to the rear wheels includes the usual cultch, the transmission gear-set inside the case marked 2, and the propeller shaft 3. The transmission set includes a shaft 5a, shown broken away for simplicity, and the usual change-speed gears located in the rear part of the case. The power take-off for the fire-pump presently described is from the transmission shaft 5a at a point between these gears and the clutch. All of this mechanism follows conventional automobile design except that the transmission shaft 5a is longer in order to accommodate the power take-off in the position stated, which is its preferred position. The usual clutch shaft 5 is connected by a rearward link 6 to the clutch pedal 7 which is fulcrumed on or by a cross-shaft 7a on the left girder of the chassis frame as shown in Figs. 3 and 4. The brake pedal may be journalled on the same cross-shaft if desired and as shown at 60 in Figs. 3 and 4. The gear-shift lever 8 being located at the rear end of the elongated transmission case 2 is in its usual position, rising through the toe-boards 9 within reach of the driver. In like manner, all of the usual engine and driving controls are to be understood as extended rearwardly to the driver's station being made accessible either on the instrument board 10 or on the steering column as usual or as preferred. For the sake of simplicity only portions of these controls appear in the drawings; they can of course be arranged in different ways according to the power plant design.

The fire-pump 11 is a rotary positive pump of standard fire-engine design mounted as stated directly behind the engine and in front of the dash partition 12, and conveniently and preferably upon the forward part of the transmission casing 2. In this position its main rotor shaft 13 is driven by a gear train shown by dotted lines 14 in Fig. 5, connectable to the transmission shaft 5a within the casing 2 and constituting the power take-off above referred to. The pump gears are enclosed within the pump casing marked 15, so that when the pump has been attached to the engine transmission case its driving connections are entirely enclosed and protected.

The take-off is indicated as two-speed and under the control of a shipper rod 16 which is operated by a hand lever 17 (Figs. 1, 3 and 4) extending laterally from the case 2 to a point outside of the vehicle frame and just above the right-hand running board. By this lever the power-drive to the pump can be cut in and out and driven at either of two speeds as desired by the operator standing alongside of the vehicle, the right-hand side in the present case. The hand lever is loosely or universally fulcrumed to the vehicle frame at 52a, so that it can be moved up and down and sidewise following the path of the slot in the guide plate 17a shown in Fig. 1. When moved upwards one of the fingers (17b) on its inner end rocks the slotted lever 18 (Fig. 8) and thereby, through link 19 and crank arm 20 rocks the clutch shaft 5 to open the engine clutch, thereby bringing the shaft 5a to rest. When then moved to right or left the other finger 17c on lever 17, engaged in the slotted head 16a of the shipper rod 16 slides one or the other of the gears 14a splined on shaft 5a into mesh with the take-off train. Whereupon the lowering of the lever handle lets in the clutch and the pump is then driven by the engine at the selected drive ratio.

The fire-pump includes two suction intake extensions 21, oppositely extending therefrom respectively through openings provided in right and left side walls of the cowling structure. The ends of these intakes 21 are normally closed by screw caps 22, which are quickly removable for making connection to the fire hydrant. When the pump is supported directly on the transmission case, as in Fig. 1, these intakes 21 are desirably braced to the sides of that case by the brackets marked 57 (Figs. 3 and 5). The fire-pump and engine are thus carried as a unit on the vehicle frame and on the same cushion mountings.

The discharge conduits 23 of the pump are also oppositely extended therefrom through the right and left side walls of the cowling structure, above the suction conduits 21, and in the case shown there are two such conduits on each side, each furnished with the usual couplings at their extremities for connection to hose-lines, normally closed by screw caps 24. These conduits are each controlled by a valve or gate 25 respectively operable by sector racks and pull rods, marked 26, but while the hose-line conduits 23 are extended in pairs through opposite sides of the cowling these four pull rods are all extended through one side, that is, the right-hand side of such cowling where they are provided with appropriate handles all of which are quickly accessible to the operator standing alongside.

As customary in fire-pumps the suction and pressure sides are connected by valve-controlled by-pass, which is adjustable to determine and maintain the delivery pressure of the pump under different load conditions. This by-pass is indicated at 11a in Fig. 4 and the two spindles 58 and 59 by which its interior mechanism is set and regulated are also extended to the exterior of the pump compartment adjacent the discharge gate handles 26. The detail of the pressure regulator contained within the by-pass is of no consequence, besides being well-known and is therefore not illustrated. An air dome 27 is provided on the pump connected to its pressure side at its highest point and directly between the four discharge conduits, space being available within the cowling for a liberal size air dome which is desirable.

The speed of the pump is regulated by controlling the engine speed through its throttle (not shown) which is operated by a push link 30 (Fig. 5) from a cross rock-shaft 31 shown as mounted on the back side of the cylinder blocks. For vehicle driving purposes this shaft is connected by a link rod represented by dot and dash line 32, or in any other suitable way, to the accelerator pedal 33. For pump control purposes the same shaft is connected by another similarly represented link-rod 34 to a crank 35 on an auxiliary throttle control rock-shaft 36 which extends to a point above the right running-board adjacent the power take-off control above described. By this auxiliary throttle control the operator standing at the right of the vehicle can vary the pumping speed as circumstances may require.

At the same location, that is to say on the right hand side of the vehicle, are also located all of the various pump and engine indicator devices which the operator needs to consult when pumping, those being grouped in an instrument panel 37. They include the engine oil pressure dial 38, tachometer 39, water-pump pressure gauge 40 and water-pump vacuum gauge 41. The panel 37 (as shown in Fig. 7) is mounted over an opening formed in one of the sections of the cowling enclosure, later referred to, so that the body parts of the several indicator instruments thereon are exposed on the interior and only their faces shown on the exterior. Their sensitive translating mechanisms are therefore maintained at substantially the same temperature conditions as the pump, practically uniform during the use of the engine, and the water gauges in particular are free of any liability to freeze in cold weather and moreover do not require to be drained of water when the pump has been shut down. The tubular connections between the several indicators and their respective parts of the pump and engine are not illustarted except that the water pressure gauge line is indicated at 42, Figs. 4, 5 and 7. The others are arranged in convenient locations as customary.

The cowling structure which forms the enclosure for the pump and engine and confines the heat of the latter about the pump and its valves and indicator devices and connections, as stated, is constituted of front and rear parts of which the front part covering the engine is constituted of the usual double-hinged hood-leaves 45 customary in automobiles and the rear part is constituted of three normally fixed cowl sections, one at the top marked 46 and one at each side marked 47. These are so dimensioned and assembled as to form a conventional automobile hood shape which, with the fire-pump on or over the transmission case, is not much longer than customary in automobiles. To this end, the three rear cowl sections are fitted by their

rear edges with an appropriate overlap upon the cowl sheet **48** (see Fig. 6) carried by the dash partition **12**, and by their front edges upon a rigid arch structure **49** which rises from the vehicle frame at about the location of the engine fly-wheel housing and is stiffened and braced by a channel-iron cleat **50**. This arch **49** forms also the rear support for the forward hinged sections **45**, the front edges of which rest on the radiator case and all being appropriately gasketed to keep out water as will be understood.

By raising one of the hinged leaves the operator has the advantage of being able to watch both the engine and the pump at the same time besides having instant access to the hose line and other controls and a direct view of all the pump indicators, all without moving from his station at the side of the vehicle. With such facilities, as will be appreciated, an unsual dispatch is accomplished in the process of getting successive hose streams on the fire.

The top cowl section **46** is normally fixed in the position stated but yet is so attached that it can be lifted off, when desired, and for this purpose it is secured in place by a series of thumb screws **46***a* as indicated in Figs. 6 and 7. When removed, direct access can be had to the pump and, if necessary, the latter can be hoisted out for repair without a general disassembly, and can be quickly replaced or substituted by another pump, thus reducing the interruption to the service occasioned by the necessity to make repairs. The side cowl sections **47** are likewise removable and after detachment from their supports can be lifted off with the pump if desired. In the dash partition **12** a hand-hole opening **12***a* is provided to give access to the rear discharge gates and by removing the toe-boards **9** access can be had to the pump gearing without removing the pump.

The crank and transmission cases and their associated parts form a sufficient closure for the bottom of the cowled-in space to confine the engine heat on the pump and its indicator connections well enough to remove all necessity for draining the water out of any of these parts even in the coldest climates.

In the modified form shown in Fig. 9 and Fig. 10 the power plant, cowling structure and general organization are substantially the same as above described, except that the fire-pump **51** in this case is supported directly on the side girders **52** of the vehicle frame, and is therefore entirely free of any supporting connection on the engine structure. In this form, the power take-off is from a so-called mid-ship transmission **53** of usual type, through a universally jointed shaft **54** controlled by a clutch lever **55** extended to the side of the vehicle, and the suction conduits **21** constitute the direct support for the pump, being provided with pads or brackets **56** whereby they are seated on and fastened to the side girders of the frame, but said conduits as well as the four hose-line connectors **23**, all project through the side cowl sections **47** of the pump compartment, on both sides, as in the form first described and with the same advantages.

In both forms, it may be noted, the whole of the vehicle body, aft of the dash partition and driver's seat, is available for carrying hose ladders and other fire-fighting paraphernalia. In prior motor pumpers in which the pump has been located under or aft of the driver's seat it has been necessary to carry the suction hose connector slung on the outside of the body because this cumbersome rubber pipe, was too long to go inside the body, but with the space under the seat now vacant such connectors, as well as ladders can be carried in the body out of sight, leaving the outside of the vehicle neat and trim and giving the vehicle as a whole a smart appearance as compared to previous pumpers. Inasmuch as the body is entirely separate from the fire-pump and engine it can be separately and economically built then to be mounted as a unit on the chassis at no more labor or cost than is involved in the mounting of an ordinary cargo truck on a stock chassis.

I claim:

1. A vehicular fire engine of the motor pumper type comprising a chassis having front and rear wheels, a housing near the front of said chassis enclosing a compartment, a power plant within the compartment for propelling the fire engine through the medium of a power line, a driver's seat arranged substantially midway between the front and rear wheels, a change speed mechanism formed in the power line forward of the driver's seat, a heavy duty water pumping assembly rigidly secured between the power plant and the change speed mechanism, a power take off for operatively connecting the pumping assembly to the power line forward of said change speed mechanism, a clutch between said power plant and said pumping assembly, the pumping assembly being largely positioned directly behind the power plant and within the said compartment with a part thereof extending upwardly substantially to the top of said compartment whereby the weight of the power plant, pumping assembly, and change speed mechanism is maintained in the forward part of the fire engine for improved operability and the pumping assembly is contained within the compartment with the power plant and is heated by the operating temperature of the power plant.

2. A vehicular fire engine of the motor pumper type comprising a chassis having front and rear wheels, a housing near the front of said chassis enclosing a compartment, a power plant within said compartment for propelling the fire engine through the medium of a power line, a driver's seat arranged substantially midway between the front and rear wheels, a change speed mechanism formed in the power line, a heavy duty water pumping assembly positioned within said compartment and rigidly secured between the power plant and the change speed mechanism including pump gauges also within the compartment while visible from the exterior thereof, a power take off for operatively connecting the pumping assembly to the power line, a clutch between said power plant and said pumping assembly, the pumping assembly being largely positioned directly behind the power plant with a part thereof extending upwardly substantially to the top of said compartment whereby the weight of the power plant and pumping assembly is maintained in the forward part of the fire engine for improved operability and the pumping assembly including the gauges is contained within the compartment with the power plant and is heated by the operating temperature of the power plant.

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