PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Fuel Systems for Motor-Cycles

We, NORTON MOTORS LIMITED, a British Company, of Bracebridge Street, Aston, Birmingham 6, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in fuel systems for motor-cycles.

According to our invention the main fuel supply of a motor-cycle is carried in one or more depending tanks extending downwardly either centrally or one on each side of the frame, means being provided for feeding the fuel from the depending tank or tanks to a relatively small header tank at a higher level.

The header tank may be located at substantially the normal elevation and from which the fuel flows by gravity to the carburettor. If the engine is liquid-cooled a single depending tank mounted centrally can be employed but if the engine is air-cooled it is preferable to employ two depending tanks arranged one on each side of the frame. In the latter case the tanks may be so located and shaped as to deflect air on to the engine.

Any convenient means may be employed for feeding the fuel from the depending tank or each of them up into the header tank from which it flows by gravity to the carburettor. For example, the fuel may be fed to the header tank under pressure or by suction or by an electric or mechanical pump.

The depending tank or tanks may be made of light alloy or other material of low specific gravity and may be of aerofoil horizontal cross-section to reduce their wind resistance. If two tanks are employed they may be curved in side elevation to conform substantially to the position of the rider's legs. Thus, in effect, they present no more frontal area than the rider's legs.

The centre of gravity of the depending tank or tanks and their contents can readily be arranged to be little, if any, higher than a line joining the wheel centres so that the amount of fuel in the depending tank or tanks has a minimum effect on the riding characteristics of the cycle.

If a header tank at the normal elevation is used it may have a substantially flat base and may taper off in depth from the front to the rear or it may have a shaped upper surface which can be upholstered and is of such a contour that in racing the rider can lie comfortably along the line of the upper surface of the tank with his body and part of his head below and behind the raised front end of the tank. The total frontal area of the cycle and rider is thus reduced to a minimum and wind resistance at high speed is correspondingly reduced.

In combination with our improved fuel tanks for racing cycles we may use a front wheel of smaller diameter than usual to reduce the frontal area of the cycle still further.

One practical motor-cycle embodying our invention and some different fuel feeding systems are illustrated diagrammatically by way of example in the accompanying drawings in

Figure 1 is a diagrammatic side elevation of a motor-cycle showing the layout of the frame, fuel-tanks and wheels.

Figure 2 is a plan of the motor-cycle.

Figures 3, 4 and 5 are diagrams showing three different fuel feeding systems.

In Figures 1 and 2 a motor-cycle is shown having a tubular frame *a*, steering head *b*, front forks *c*, front wheel *d* mounted in the forks *c*, pivoted rear forks *d* in which is mounted the rear wheel *e* and which are supported by telescopic struts *f*, and a padded saddle *g*.

The fuel for the engine (not shown) is carried in a small header tank *h* and two depending tanks *j j* extending downwardly on each side of the front part of the frame. Each of the depending tanks *j* is substan-

[*Price*

tially of aerofoil horizontal cross-section as shown in Figure 2. The inner wall of the tank is curved at its forward end as shown at *k* to deflect air on to the engine which lies substantially between the two depending tanks. At the rear end of each depending tank the outer wall is set in to form a recess *l* of such a shape as to conform to the outline of the rider's leg in the normal riding position. The surface of the recess may be covered with rubber or fitted with rubber pads to form knee-grips.

The header tank *h* has a substantially flat base and the front is curved upwardly and rearwardly to merge into the inclined upper surface of the tank. That surface may be padded to form a rest for the rider's chest.

Various means may be employed for feeding the fuel from the depending tanks *j j* into the header tank *h*.

In the system shown in Figure 3 a fuel pump *m*, which may be an electric pump or may be a mechanical pump driven by the engine, draws fuel from the depending tanks *j* and delivers it into the header tank *h* at a rate higher than that at which fuel is used by the engine. Surplus fuel returns through an overflow pipe *n* to the tanks *j* so that a constant level of fuel is maintained in the tank *h* from which the fuel flows by gravity to the carburetor *p*.

In the modification of that system shown in Figure 4 the header tank *h* is reduced to a minimum size and replaces the float chamber of the carburettor *p*. Fuel is fed direct to the chamber from the depending tanks *j* by the pump *m* and an overflow pipe *n* maintains the fuel level in the chamber constant.

In the system shown in Figure 5 the depending tanks *j* are put under pressure to force the fuel up into the header tank. The tubes of the motor-cycle frame *a* are used as a high-pressure air reservoir into which the air is forced at a point *q* provided with a non-return valve. The air from the frame tubes is fed through a reducing valve *r* to to the tanks *j j* from which the fuel is forced up into the header tank *h*.

The fuel enters the tank *h* through a valve *s* designed to maintain a constant level of fuel in the tank *h* from which the fuel flows under gravity to the carburettor *p*.

In yet another system the fuel may be drawn from the depending tanks into the header tank by a vacuum feed or equivalent device actuated by the depression in the engine intake.

In a pressure system, instead of the header tank being under atmospheric pressure the whole fuel system may be maintained under pressure up to the float chamber of the carburettor.

What we claim is:—

1. A motor cycle in which the main fuel supply is carried in one or more depending tanks extending downwardly either centrally or one one each side of the frame, means being provided for feeding the fuel from the depending tank or tanks to a relatively small header tank at a higher level.

2. A motor cycle in which the fuel supply is carried in a relatively small header tank at substantially the normal elevation and in one or more depending tanks extending downwardly either centrally or one on each side of the frame, and means are provided for feeding fuel from the depending tank or tanks to the header tank from which it flows under gravity to the carburettor.

3. A motor cycle as claimed in Claim 1 or 2 in which there are two depending tanks one on each side of the engine and the tanks are of aerofoil cross-section and their inner surfaces are arranged to direct air on to the engine.

4. A motor cycle as claimed in Claim 3 in which the outer surfaces of the rear parts of the tanks are set in to form recesses to receive the rider's legs.

5. A motor cycle as claimed in Claim 1 or 2 in which the fuel is fed from the depending tanks to the header tank at a rate higher than that at which is used by the engine, the level of the fuel in the header tank being maintained constant by an overflow pipe which returns surplus fuel to the depending tank.

6. A motor cycle as claimed in Claim 1 or 2 in which the depending tanks are put under pressure to force fuel from them up into the header tank.

7. A motor cycle as claimed in Claim 6 in which air under pressure is fed to the depending tanks through a reducing valve from the tubular frame of the motor cycle which is used as a high pressure air reservoir.

8. A motor cycle having fuel tanks arranged substantially as described with reference to the accompanying drawings.

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PROVISIONAL SPECIFICATION

Improvements in or relating to Fuel Systems for Motor-Cycles

We, NORTON MOTORS LIMITED, a British Company, of Bracebridge Street, Aston, Birmingham 6, do hereby declare this invention to be described in the following statement:—

This invention relates to improvements in

motor-cycles.

The fuel supply of a motor-cycle is normally carried in a tank fitting over the upper part of the frame between the handle-bars and the saddle so that the centre of gravity of the tank and its contents is relatively high, and as the tank is usually of substantial capacity there is a considerable difference in weight between a full tank and an empty tank.

Another disadvantage of this type of tank is that it not only has a large frontal area which becomes very important in racing or even in high speed touring but it prevents the rider from adopting a stream-lined position on the machine.

According to our invention the fuel supply of a motor-cycle is carried in a relatively small tank at substantially the normal elevation and in one or more depending tanks extending downwardly either centrally or on each side of the frame. If the engine is liquid-cooled a single depending tank mounted centrally can be employed but if the engine is air-cooled it is preferable to employ two depending tanks arranged one on each side of the frame. In the latter case the tanks may be so located and shaped as to deflect air on to the engine.

The depending tank or each of them is conveniently put under pressure to force the fuel from it up into the main or header tank from which it is fed by gravity to the carburettor in the usual way, valves being provided to maintain the fuel in the header tank under atmospheric pressure. A convenient way of doing this is to use the frame tubes of the machine as a high-pressure air reservoir which is connected to the depending tank or tanks through a reducing valve.

Alternatively, the fuel may be drawn from the depending tank or tanks into the header tank by a vacuum feed or equivalent device actuated by the depression in the engine intake or it may be pumped up by an electric or mechanical pump.

In another arrangement, instead of the header tank being under atmospheric pressure the whole fuel system may be maintained under pressure up to the carburettor.

The depending tank or tanks may be made of light alloy or other material of low specific gravity and may be of aerofoil horizontal cross-section to reduce their wind resistance. If two tanks are employed they may be curved in side elevation to conform substantially to the position of the rider's legs. Thus, in effect, they present no more frontal area than the rider's legs.

The centre of gravity of the depending tank or tanks and their contents can readily be arranged to be not higher than a line joining the wheel centres so that the amount of fuel in the depending tanks has a minimum effect on the riding characteristics of the machine.

The main or header tank may have a substantially flat base and may taper off in depth from the front to the rear or it may have a shaped upper surface which can be upholstered and is of such a contour that in racing the rider can lie comfortably along the line of the upper surface of the tank with his body and part of his head below and behind the raised front end of the tank. The total frontal area of the machine and rider is thus reduced to a minimum and wind resistance at high speed is correspondingly reduced.

In combination with our improved fuel tanks for racing machines we preferably use a front wheel of smaller diameter than usual to reduce the frontal area of the machine still further.

Dated this 26th day of May, 1951.

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FIG. 1.

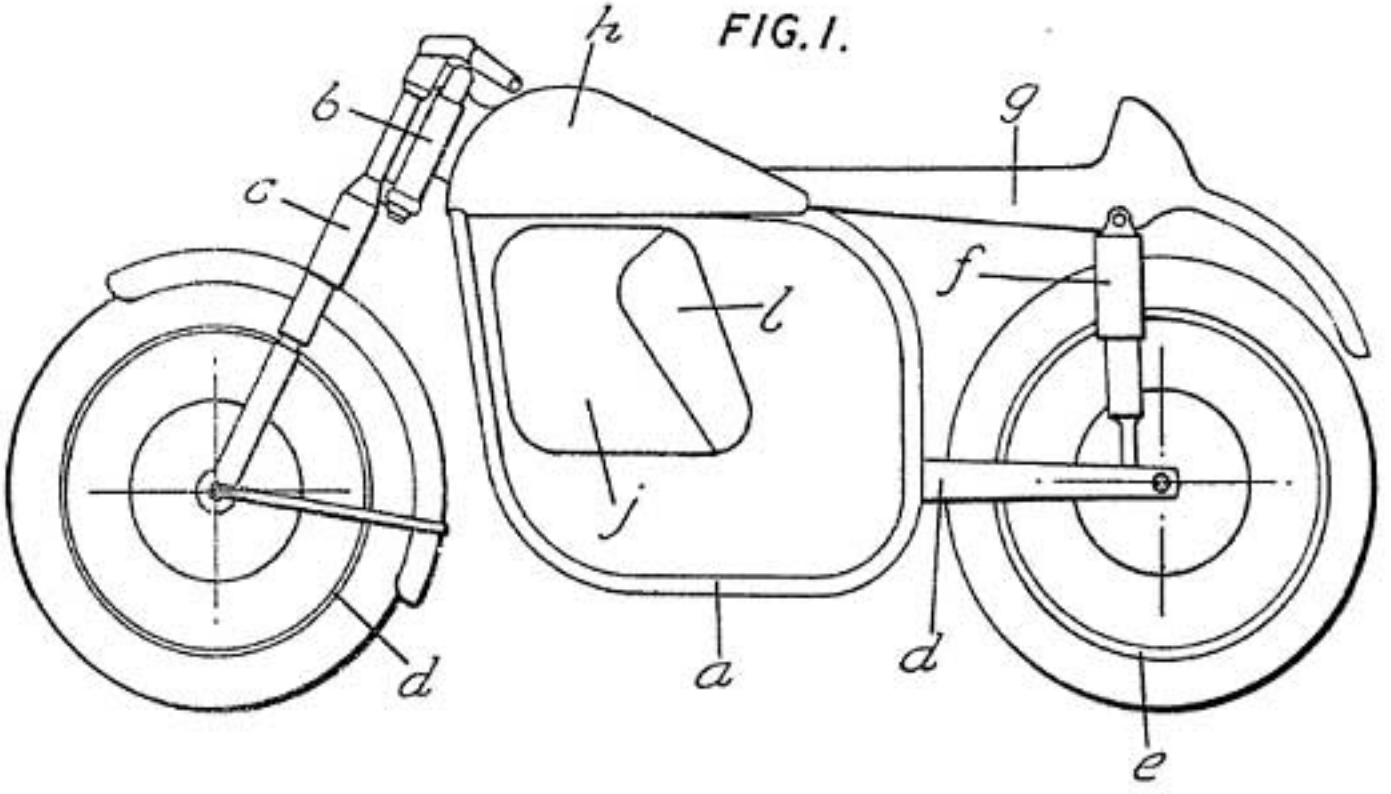
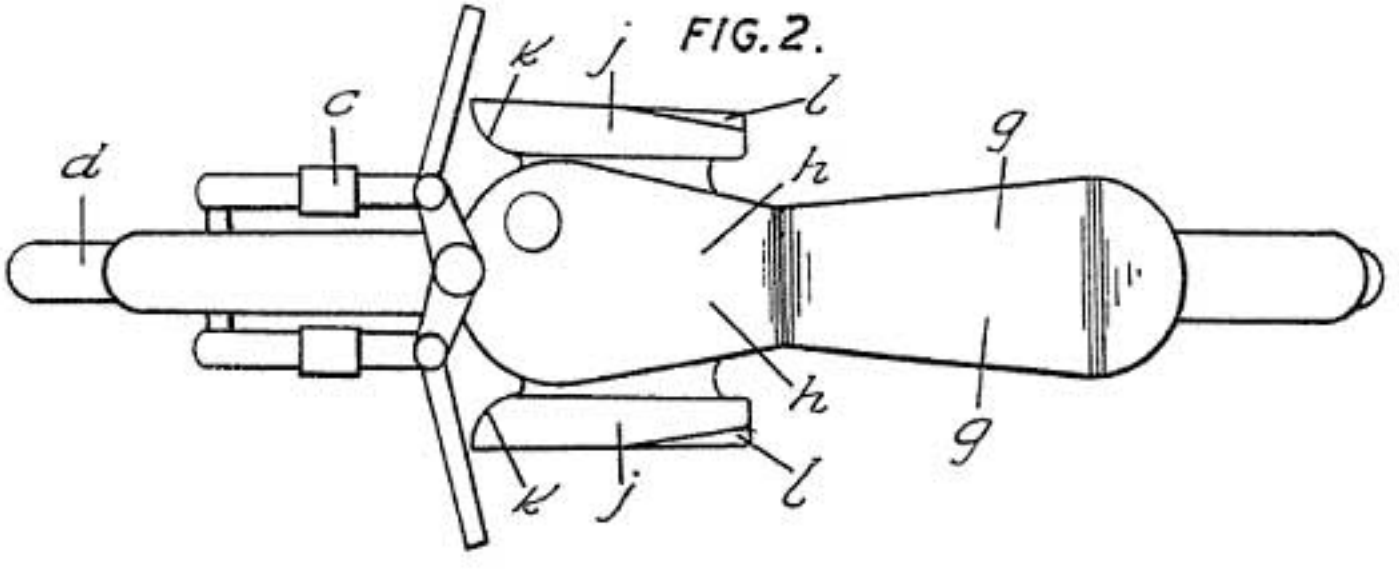


FIG. 2.



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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1 & 2

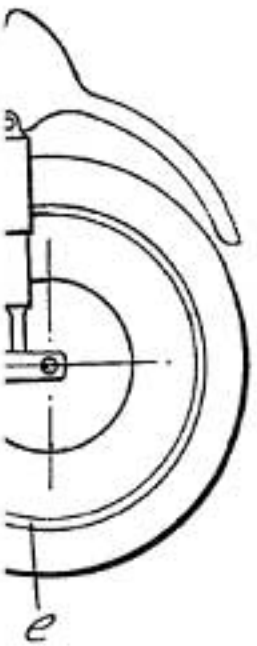

FIG. 3

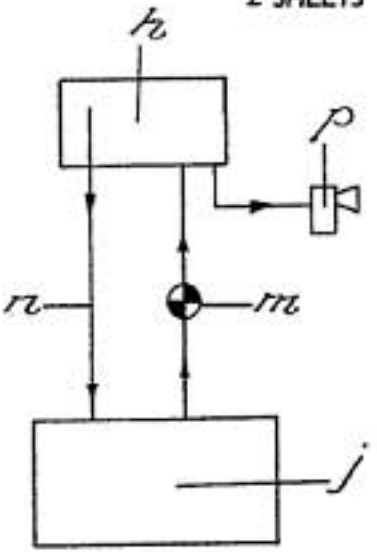

FIG. 4