(No Model.) 2 Sheets—Sheet 1.

C. BENZ.

CARBURETOR.

No. 382,585. Patented May 8, 1888.

Fig. 1.

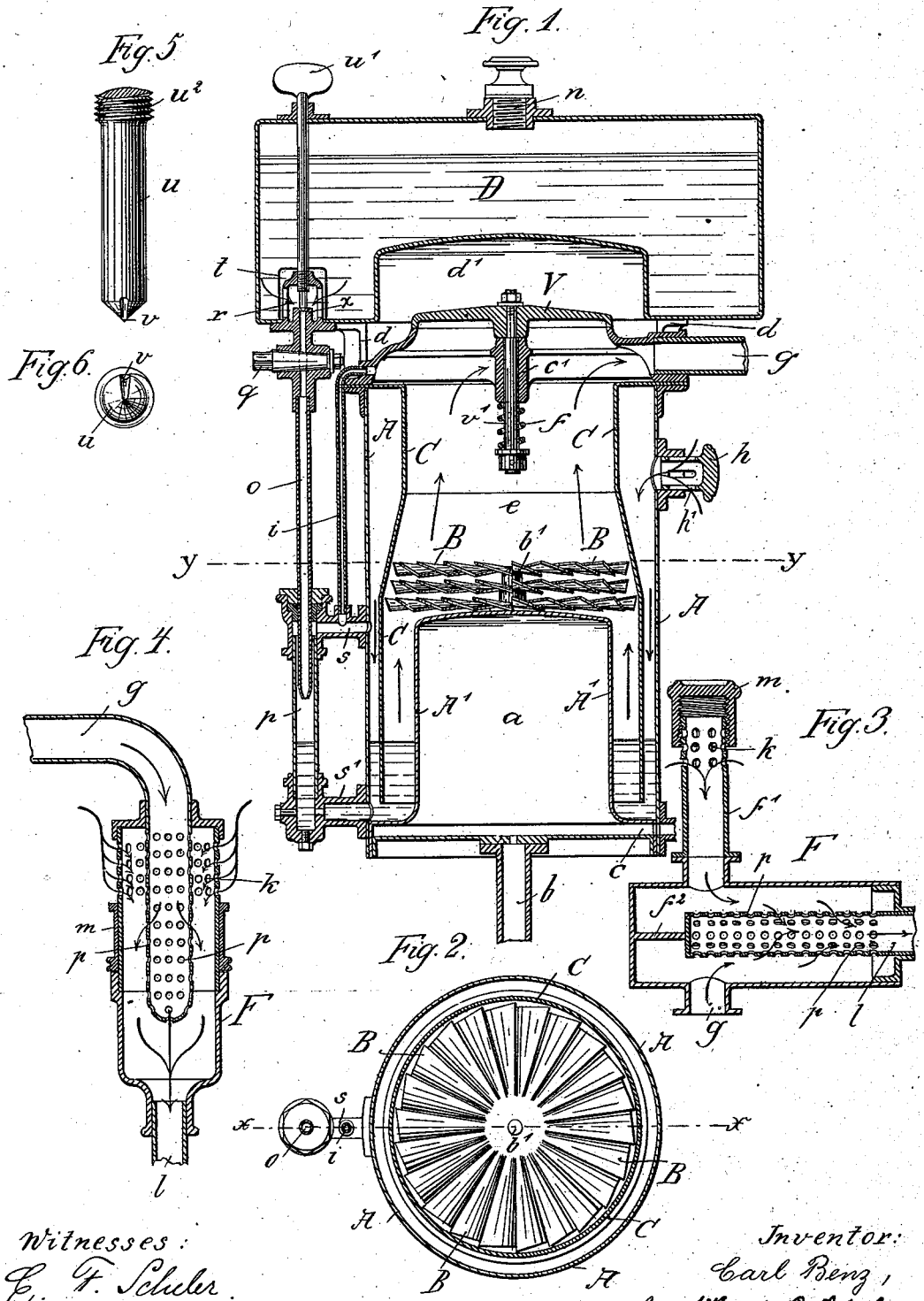

Fig. 5

Fig. 6.

Witnesses:
C. F. Schuler.
Whipp.

Inventor:
Carl Benz,
by: Mitchell & R. D. Fisher.
his attorneys.

(No Model.) 2 Sheets—Sheet 2.

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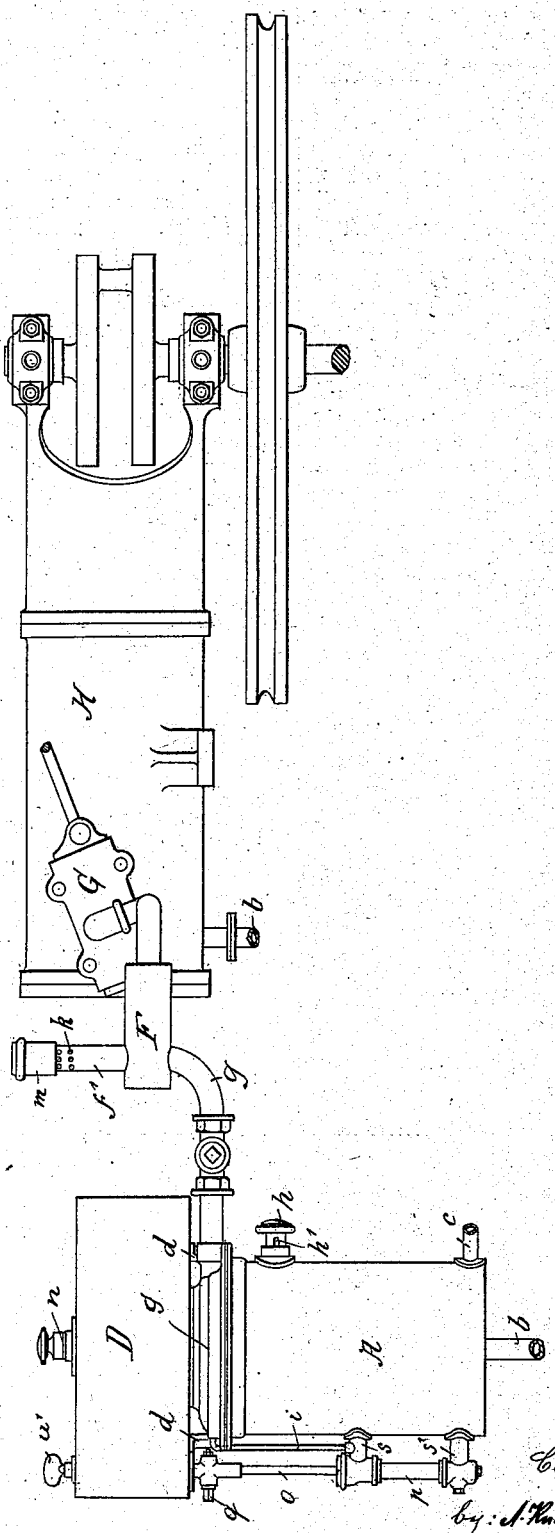

Fig. 2.

Witnesses:
C. F. Schuler.
M. Hoppf.

Inventor:
Carl Benz,
by: A. Richard & R. Tewsler.
his attorneys.

UNITED STATES PATENT OFFICE.

CARL BENZ, OF MANNHEIM, BADEN, GERMANY, ASSIGNOR TO BENZ & CO., OF SAME PLACE.

CARBURETOR.

SPECIFICATION forming part of Letters Patent No. 382,585, dated May 8, 1888.

Application filed October 24, 1887. Serial No. 253,199. (No model.) Patented in France March 25, 1886, No. 175,027, and in England April 28, 1886, No. 5,789.

To all whom it may concern:

Be it known that I, CARL BENZ, a subject of the Grand Duke of Baden, and a resident of Mannheim, in the Empire of Germany, have invented certain new and useful Improvements in a Carburetor for Operating a Motor for Vehicles, (for which I have obtained Letters Patent in England, No. 5,789, dated April 28, 1886, and in France, No. 175,027, dated March 25, 1886,) of which the following is a full and clear description.

The invention has for its object to overcome the injurious effects exercised upon the generator by the shaking or jolting of the vehicle, to be able to construct the generator of the lightest material possible, and to prevent an explosion or combustion of the whole gas-store; and the invention consists in the arrangement of disks inside the generator proper above the level of the fluid, preventing the movement of the fluid but allowing the vapors to pass through such disks, in a device for equalizing the pressure within and outside of the generator, and in a peculiarly-constructed gas and air mixing chamber.

These improvements are shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the gas-generator on line *x x* of Fig. 2. Fig. 2 is a transverse sectional view on line *y y* of Fig. 1. Fig. 3 shows the gas and air mixing chamber in a longitudinal section. Fig. 4 is a similar view of a modified construction of the mixing-chamber. Fig. 5 is an enlarged side view of part of the feed-valve from the tank or reservoir. Fig. 6 is an end view of the same, and Fig. 7 is a complete side elevation of my gas-generating apparatus in connection with a motor having a horizontally-mounted working-cylinder.

Similar letters of reference indicate similar parts throughout the several views.

In the drawings, D is the tank filled with benzine, gasoline, petroleum, naphtha, or similar evaporative oil, and being mounted on suitable standards, *d*, on top of the generator A C.

The tank D may be of any shape whatever, and it needs not stand on the generator; but I prefer to mount it in that manner, since there is generally but little room on the vehicle. For filling the tank or reservoir D, it is provided with an orifice closed by a screw-cap, *n*. Besides that it has recess *d'*, of circular or cylindrical form, on its lower side, made to correspond to the size of the cover V of the generator-vessel, being situated below, so that the cover V may enter into said recess when being raised or lifted. A pipe, *o*, is led from tank D to and into a gage-glass, *p*, said pipe having a regulating-valve, *x*, and a stop-cock, *q*. The spindle *u* of the regulating-valve passes through the tank D, and is provided with screw-threads u^2 near its lower end, by which it is secured in and guided through a small hinge-like support, *r*, being fastened to the bottom of the tank. The point or end of spindle *u* is provided with a radial groove, *v*, and fits into the upper end of pipe *o*. The lower part of this feed-valve is surrounded by a perforated cap, *t*, for retaining all impurities of the oil and preventing them from entering pipe *o*.

The generator consists of two vessels, A and C. Vessel C is inserted or hung up in vessel A, nearly touching the bottom of the latter. Vessel A has a recess or dome, A', at its bottom, standing in connection with the sliding valve-case G of the motor H by a pipe, *b*, as shown in Fig. 7, pipe *b* being broken away near its ends. The dome is also provided with an outlet-port, *c*, near its bottom, for the escape of the waste gases coming through pipe *b* from the sliding valve-box G. The outside cylinder, A, is also provided with a screw-valve, *h*, with slits *h'* for the entrance of air. To the top of said dome A' is secured a stud, *b'*, being provided with several disks, B, of sheet metal, being slit radially, and the radiating wings so formed are bent into an inclined position, resembling the sails of a windmill. The cover V of cylinder C is constructed to serve as a safety-valve, and is provided with a shaft or pin, *v'*, passing through the same and through a hub or neck, *c'*, of vessel C, and being provided with a spiral spring, *f*, arranged and constructed to keep the cover firmly upon the generator at ordinary pressure within the generator.

The outside cylinder, A, of the generator is

connected to the gage-glass *p* by two short pipes, *s* and *s'*, the one entering said glass near its top, the other at the bottom end. Pipe *s* is also in communication with generator C by a very thin pipe, *i*. A pipe, *g*, leads from the top end of generator C to the mixing-chamber F, which is necessary for the production of the explosive mixture. This mixing-chamber I may construct in two ways. That one shown in Figs. 3 and 7, consists of the mantle or jacket F, being provided with a projecting pipe, *f'*, having small openings *k* and a screw-cap, *m*, and of a pipe, *l*, being inserted in said jacket and leading to the sliding valve-box G of the motor. This pipe *l* is also provided with perforations *p* inside the mantle F, which latter may be divided in two parts by a partition, *f²*.

In the construction of the mixing-chamber shown in Fig. 4 the pipe *g*, coming from the generator, enters the jacket F, and is closed at its end, and is perforated in same manner as pipe *l* of Fig. 3. The jacket F in this case has no projecting pipe, but is perforated itself near the end at which pipe *g* is guided into it. To the opposite end of the jacket is connected pipe *l*, leading into the sliding valve-box *g* in same manner as shown in Fig. 7.

The mixing apparatus as first described I preferably employ in such cases where my gas-generating apparatus is used for working a motor having a horizontal cylinder, while I prefer the construction of said mixing-chamber, as illustrated by Fig. 4, in connection with an upright standing motor.

After having thus described the construction of my apparatus, I shall now proceed to explain the manner in which this apparatus is operated, which is as follows: The evaporative oils, being filled into the reservoir D, will run through pipe *o* and gage-glass *p* into the generator C and the surrounding cylinder A when feed-valve *u* and stop-cock *q* are widely opened. This I do before starting the machine, which has to be fed from my generator, and I allow the oils to flow into the generator until the level of the fluid is about as high as is shown in Fig. 1 of the accompanying drawings. I then close stop-cock *q* and regulate feed-valve *u*, so that the fluid can only enter the pipe *o* in drops—*i. e.*, in proportion to the quantity of oil being evaporated in the generator C. The oils consist, as already told, of benzine, ligroine, or the like hydrocarbons which already commence to evaporate at ordinary temperature—that is, at about 65° to 75° Fahrenheit. The vapors will pass up in the generator C, through the slits of disks B into pipe *g*, and thence into the gas and air mixing chamber F. Referring to Figs. 3 and 7, the vapors enter said chamber from below, go through openings *p* of pipe *l*, and thence into the sliding valve-box G. When entering pipe *l*, the vapors are mixed very intimately with the atmospheric air coming through the perforated pipe *f'*, and thus a powerful explosive mixture is produced. It will happen sometimes that the mixture meets burning particles of the gases from the preceding explosion in the sliding valve-case G, and these particles will then inflame the entering current of vapor, but an explosion will only take place up to the point where the air is fed to the vapors. A further explosion in the gas apparatus is rendered impossible, and only material for one explosion in the cylinder is lost, the store of the gas-generator being preserved. The construction of the mixing-cham- F outside the gas-generator is therefore a chief point in my present improvements.

The waste gases from the motor-cylinder H are conducted back to the generator through pipe *b*, (see Fig. 7,) and enter the dome *a*, where they communicate their heat to the petroleum or similar fuel in the generator, and thus increase the evaporation of the latter. They finally pass out of the generator through pipe *c*.

When the pressure within the generator should become too great, the cover V of the generator will be raised by the force of the vapors, and the latter then escape into the air; but this will rarely happen, for the pressure within and outside the generator C is equalized by regulating-screw *h* of the cylinder A, and by pipe *i*, connecting the top end of the generator C with cylinder A, as can be plainly seen in Fig. 1. When the pressure without is greater than within, atmospheric air will enter through the openings *h'* of screw-cap *h* into the cylinder A, and thence through pipe *s* and *i* into the generator C; but the amount of air passing through pipe *i* into the generator will be very small, since the air will press at the same time on the liquid in vessel A in the direction of the arrows, and the level of said liquid will fall in vessel A and rise in the generator C, and the air will even enter through the fuel into the generator. The quantity of air thus introduced, however, will not be sufficient to render the vapors or gases within generator explosible. That property the gases attain after they have entered the mixing-chamber, as already told. Beside, it must be mentioned that the quantity of air entering the cylinder or mantle A may be regulated by screw-valve *h*, as will be understood without further explanation, and the air entering the vessel A also serves for cooling or chilling the generator C.

The oil within the gage-glass *p* always stands upon the same level as that in the generator, as the latter is connected to the gage-glass by pipes *s'* and *s*, the former for the circulation of the liquid, the latter for that of the gases, so that both matters—*i. e.*, the pressure of these matters—is equal in the gage-glass *p* and generator C.

The mixing-chamber F, as shown in Fig. 4, is based on the same principle as that in Fig. 3. The gases enter in this case through pipe *g* into the chamber F, where they meet with the atmospheric air coming through openings *k*, and both are mixed and drawn off through pipe *l* into the sliding valve-box G.

The current of air entering the mixing-chamber through openings *k* may be regulated in both constructions by a cap or ring, *m*, which can be screwed or shoved over part of these openings *m*.

When the vehicle on which my generator is mounted should be tossed about or jolting, the fuel within the vessel C is prevented from movement by disks B, and thus the amount of evaporating gases will be a constant one.

My improved gas-generator may be used for working gas-engines of any construction; but it is especially adapted for vehicles or small boats, as it is very safe and as its weight is decreased as much as ever will be possible.

I am aware that prior to my invention gas-generators have been constructed in which the generated gas was produced from hydrocarbons which evaporate at a low temperature. I do not, therefore, claim such an apparatus, broadly; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In carbureting apparatus, the combination of a hood, C, suspended within the casing A, with the disks B, said disks being fastened to the top of dome A′ and being slit, and the slotted parts being bent at an angle to the horizontal plane of the disks, and the mixer, F, substantially as and for the purpose set forth.

2. In carbureting apparatus, the combination of an outer casing, A, with a screw-valve, *h*, for regulating the admission of air into said casing, an inner hood, C, open at the bottom and suspended in said casing A, said hood being provided with an outlet, *g*, for the generated vapors generated from the liquid in the hood C and casing A, and the disks B within the hood C, substantially in the manner and for the purpose set forth.

3. In carbureting apparatus, the combination of a feeding device consisting of a pipe, *o*, connecting the reservoir D with the casing A, and a valve-spindle, *u*, passing through the tank D, and provided with a handle, *u′*, and screw u^2, for regulating the valve *x*, and with the groove *v*, in connection with the gage-glass *p*, communicating with the reservoir D by the pipe *o* and with the casing A by the pipes *s* and *s′*, substantially in the manner and for the purpose set forth.

In witness whereof I hereunto set my hand in presence of two witnesses.

CARL BENZ.

Witnesses:
CURT KÖHLER,
EUGEN HAAG.