

No. 633,878.

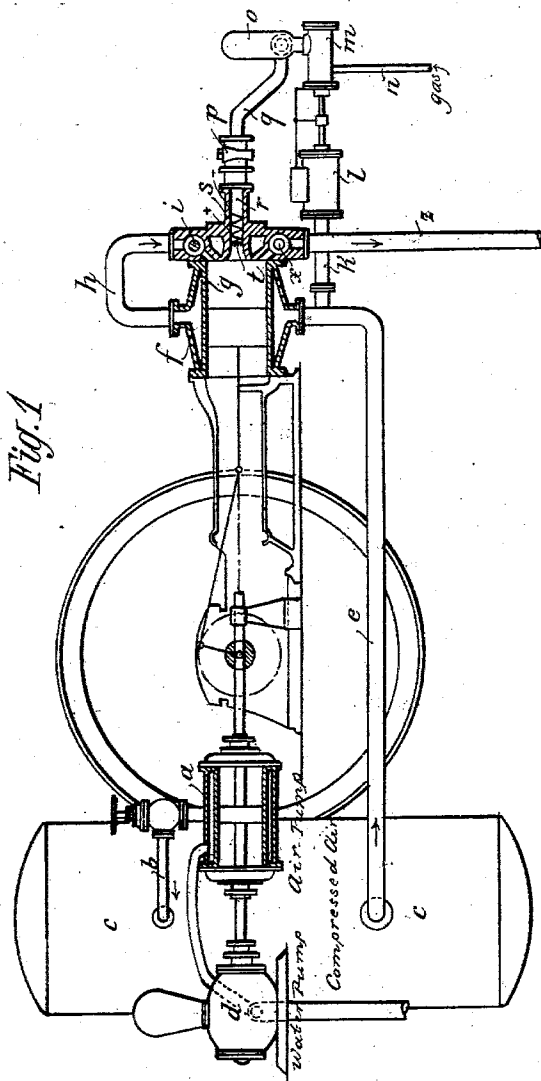
Patented Sept. 26, 1899.

R. MEWES.
COMBUSTION MOTOR.

(Application filed June 2, 1898.)

2 Sheets—Sheet 1.

(No Model.)



Witnesses.
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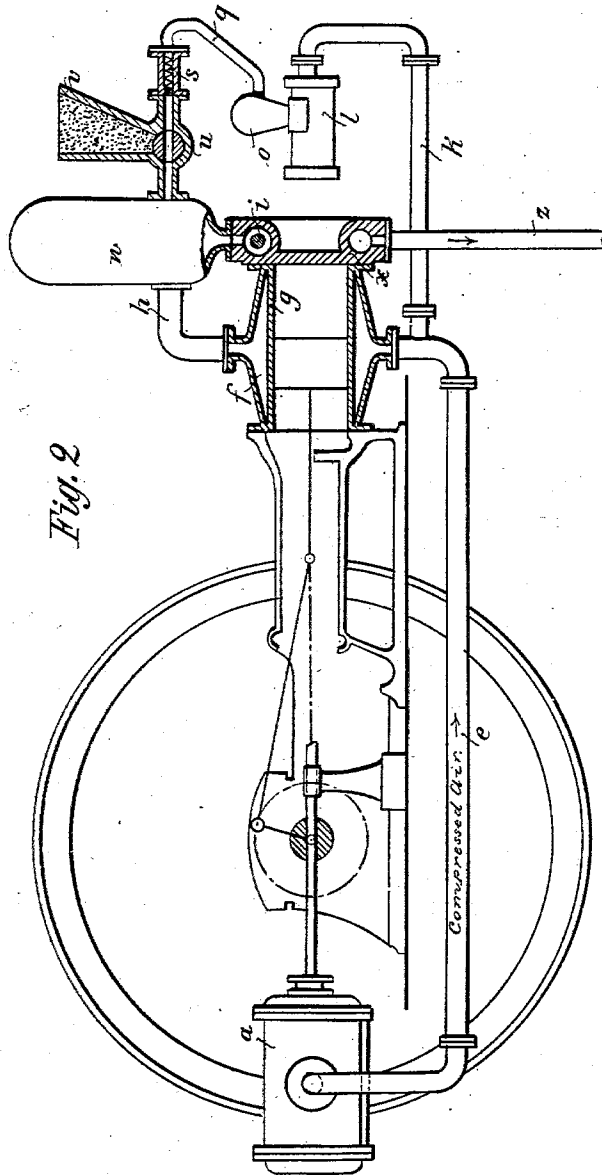
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Witnesses:
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UNITED STATES PATENT OFFICE.

RUDOLF MEWES, OF BERLIN, GERMANY, ASSIGNOR TO WACHTEL & STOLTZ,
OF SAME PLACE.

COMBUSTION-MOTOR.

SPECIFICATION forming part of Letters Patent No. 633,878, dated September 26, 1899.

Application filed June 2, 1898. Serial No. 682,395. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF MEWES, a subject of the German Emperor, residing at Berlin, in the German Empire, have invented certain new and useful Improvements in Combustion-Motors, of which the following is a specification.

This invention relates to a combustion-motor in which the gaseous or sprayed fuel, or a mixture of gaseous, liquefied, sprayed, or pulverized fuel, or the air employed for feeding in pulverized solid fuel when such is used is compressed to such an extent as to heat it to a temperature above the ignition temperature and thereupon forced under pressure either into the cylinder, which is supplied with compressed air at a lower temperature, or into a vessel in communication therewith and serving as a combustion-chamber. By this means the following advantage as compared with combustion-motors of the known kind is obtained: the air conducted to the working cylinder to support combustion may be cold and the temperature during the process may be kept as low as is permissible according to the constructional parts, packing, &c., employed in the machine.

The engine or motor may be so arranged that it produces itself the heated air required for its operation. If the compressed air serving to support combustion and conducted to the working cylinder is obtained by compression, then the heat produced by such compression, contrary to what takes place in machines in which the working cylinder has to be cooled, may be employed for heating the working cylinder from without. If, however, the said utilization of the heat produced by compression is not desired, other means of cooling this air may be employed. In either case the compressed air conveyed to the working cylinder is lower in temperature than the combustible mixture, which, as above stated, is heated to above the combustion temperature outside the working cylinder and conducted into the said compressed air.

In the accompanying drawings two constructional forms of the improved combustion-motor are illustrated in Figures 1 and 2, respectively.

In the constructional form illustrated in

Fig. 1, *g* is the working cylinder; *a*, an air-compressor; *d*, a water-pump, and *c* a compressed-air vessel which is filled with compressed air prior to starting the machine. While the engine or motor is running the compressor *a* is operated by means of the working piston of the cylinder *g*, and the compressed air is forced into the compressed-air vessel *c* through the pipe *b*, whence it passes through the pipe *e* to the working cylinder *g*. This may take place directly; but it is conducive to higher efficiency if the compressed air is first of all allowed to pass around the cylinder *g*, for which purpose the latter may be provided with the jacket *f*. From this latter the compressed air is conducted through the pipe *h* and through the suitably-governed valve *i* to the cylinder *g*. During or subsequent to the admission of the compressed air to the cylinder *g* the fuel is introduced in a gaseous, liquid, or solid form and under a pressure which is higher than the pressure of the compressed air.

In the constructional form of the engine or motor illustrated in the drawings it is assumed that burning gas is to be introduced into the compressed air. The gas is in this case conducted to the pump *m* through the pipe *n*. In the pump *m* the gas is so strongly compressed as to thereby become heated above the combustion temperature. From the pump *m* the highly-compressed gas passes, preferably by way of a pressure vessel *o*, through the pipe *q*, which is provided with a cock *p*, into the cylinder *g*, through the nozzle *r*, in front of which may be arranged gauze *t*. Moreover, in front of the mouth of the nozzle *r* I may arrange a device for further heating the gas forced through. In the drawings this device is shown as an electric heating-spiral *s*. As the gas has already been heated to above the ignition temperature by compression in the pump *m* and as in addition to this the temperature due to the compression may be increased by means of the superheating device the gas burns directly upon entering the cylinder *g* without any necessity for a special ignition device.

The pump *m* may be operated in any desired manner. In the constructional form shown in Fig. 1 the compressed-air motor *l*

is provided for this purpose, the same being in communication with the compressed-air pipe *e* by means of the pipe *k*.

The supply of fuel is so regulated that either at each stroke of the pump *m* a certain quantity is forced into the cylinder *g* or a special distributing mechanism may be provided for regulating the supply of fuel. The removal of the spent gaseous mixture from the cylinder *g* may be effected in the well-known manner by means of the valve *x* and the outlet-pipe *z*.

The pump *d* serves in case of need to spray cooling-water into the compressor *a* or to force cooling-water through the jacket of the compressor by means of a connecting-pipe *P* in order to counteract the heating of the compressed air due to the compression. The compressed air thus also serves for cooling the cylinder *g*. By suitably proportioning the quantity of cooling-water the temperature of the compressed air may be so regulated by means of the arrangement described that the compressed air reaches the cylinder *g* at a fixed temperature.

The constructional form of the engine or motor illustrated in Fig. 2 is adapted to the supply of solid fuel in the form of powder. The compressed-air vessel *c* of the previous example is dispensed with only when the maximum temperature of the working mixture is to be low (about 300° to 400° centigrade) and the starting-pressure as high as possible. In this case the compressed air is conducted direct from the compressor *a* through the jacket *f* for the purpose of heating the expanded working mixture, likewise through the pipe *h* to the pressure vessel *w*, from which it passes into the cylinder *g* through the valve *i*. The pulverized fuel is placed in the receptacle *v* in front of the pressure vessel *w*. Beneath the said receptacle is arranged the pipe *q*, provided with a distributing-cock *u*, which periodically admits a certain quantity of the powdered fuel, and the current of compressed air from the pump *l* passes along with it and enters the cylinder *g* through the air vessel *w* and the valve *i*. The compression-pump *l* is supplied with the necessary quantity of air from the compressed-air pipe *e* by means of the pipe *k*. By means of a lateral slot in the plug of the cock *u* it may be provided that the compressed-air pipe *q* may before the plug-boring reaches the horizontal position already be in communication with this latter and a preliminary heating of the coal-dust be effected. A gas may likewise be employed for the supply of the coal-dust. In either case it is important that for the purpose of forcing in the pulverized fuel air or gas should be employed which has been previously heated above the combustion temperature of the fuel by compression.

The engine or motor may either be open, as in the drawings, or closed. In the latter case the final pressure of the working mix-

ture may be lower than the external-atmosphere pressure.

With the constructional form shown in Fig. 2 the compressed air may be cooled by water-spraying without the provision of the jacket *f*, as in the constructional form illustrated in Fig. 1, then conducted directly into the pressure vessel *w*, and thence admitted into the cylinder *g* by means of the distributing-valve *i*.

I claim—

1. The combination with the working cylinder and piston, of an air-compressor, means for cooling the air, a fuel-supply, means for compressing the fuel to a higher pressure than that of the air and for heating the same to above the combustion-point, and means for introducing into the working cylinder first the compressed air and then the fuel.

2. The combination with the working cylinder and piston, of an air-compressor, a fuel-supply, means for compressing the fuel to a higher pressure than that of the air and for heating the same to above the combustion-point, and means for introducing into the working cylinder first the compressed air and then the fuel.

3. The combination with the working cylinder and piston, of an air-compressor, a vessel adapted to contain the compressed air, another vessel adapted to contain the fuel, means for compressing the fuel to a higher pressure than that of the air and for heating the same to above the combustion-point, and means for introducing into the working cylinder first the compressed air and then the fuel.

4. The combination with the working piston and the working cylinder having a jacket, of an air-compressor connected with said jacket, another connection leading from the jacket to the working cylinder, means for compressing the fuel to a higher pressure than that of the air and for heating the same to above the combustion-point, and means for introducing into the working cylinder first the compressed air and then the fuel.

5. The combination with the working piston and the working cylinder having a jacket, of an air-compressor connected with said jacket, another connection leading from the jacket to the working cylinder, means for compressing the fuel to a higher pressure than that of the air and for heating the same to above the combustion-point, and means for introducing the compressed air and the fuel into the working cylinder.

6. The combination with the working cylinder and piston, of an air-compressor, means for cooling the air in said air-compressor, a fuel-supply, means for compressing the fuel to a higher pressure than that of the compressed air and for heating the same to above the combustion-point, a connection from the air-compressor to the working cylinder, a valve in said connection, and means for introducing the compressed air and the fuel into the working cylinder.

7. The combination with the working cylinder and piston, of an air-compressor, means for compressing fuel to produce a temperature higher than the combustion temperature, and
5 connections for leading the air and fuel to the cylinder.

8. The combination with the working cylinder and piston, of means for compressing air and leading it to the cylinder in a comparatively cool condition, and means for in-
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jecting into said air, compressed fuel of a higher temperature than the combustion temperature.

In witness whereof I have hereunto signed my name, this 18th day of May, 1898, in the presence of two subscribing witnesses.

RUDOLF MEWES.

Witnesses:

C. H. DAY,

HENRY HASPER.