B. ANGWIN.

UTILIZATION OF COMPRESSED AIR FOR MOTIVE POWER PURPOSES.

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1,196,635. Patented Aug. 29, 1916.

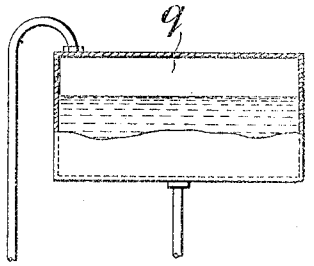


Fig. 1.

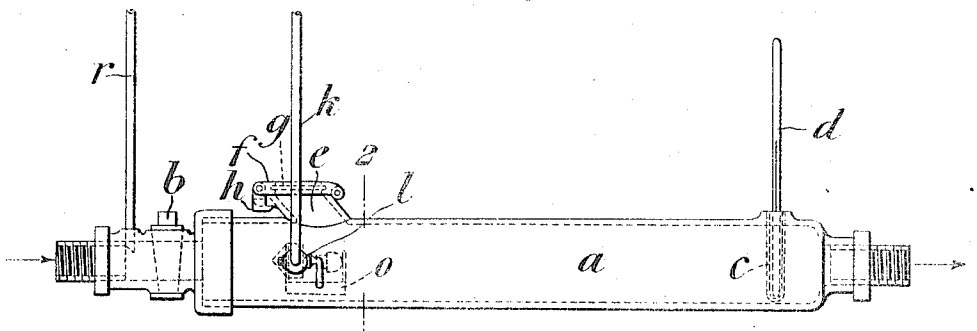
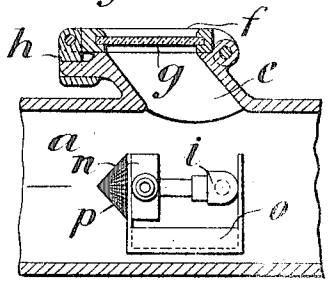


Fig. 3.

Fig. 2.



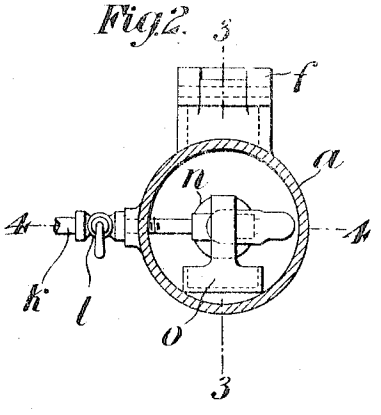
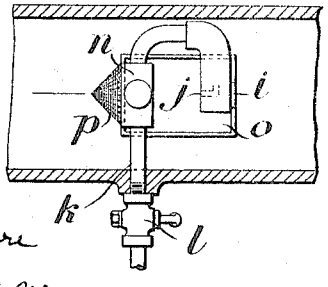


Fig. 4.



Witnesses.
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THE HOBBS-PETERS CO. PHOTO LITHO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

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UTILIZATION OF COMPRESSED AIR FOR MOTIVE-POWER PURPOSES.

1,196,635. Specification of Letters Patent. Patented Aug. 29, 1916.

Application filed July 28, 1915. Serial No. 42,457.

To all whom it may concern:

Be it known that I, BENJAMIN ANGWIN, a subject of the King of Great Britain, residing at Penlu Terrace, Tuckingmill, Camborne, Cornwall, England, have invented new and useful Improvements in the Utilization of Compressed Air for Motive-Power Purposes, of which the following is a specification.

My invention has for its object to provide means for augmenting the energy of compressed air after it has left the air compressor and before it is utilized in any engine, pump or other machine driven thereby.

According to my invention I provide for heating the compressed air after it leaves the compressor and directly before it enters the machine to be operated, so that the loss of heat during compression and transmission is compensated for, and so that the expanding air will not reach so low a temperature as would otherwise be the case.

In carrying out my invention, I propose to generate and sustain a flame within the air tube or conduit by the combustion of gas or oil, preferably at a point as near as possible to that at which the air is to be utilized, electrical or other means being provided for igniting the flame within the pipe as and when required.

To enable my invention to be fully understood I will describe the same by reference to the accompanying drawing, in which:—

Figure 1 is a sectional side elevation of an arrangement or apparatus suitable for carrying out my invention. Fig. 2 is a section on the line 2—2, of Fig. 1, drawn to an enlarged scale, and Figs. 3 and 4 are sections on the line 3—3 and 4—4, respectively of Fig. 2.

a indicates a chamber, which, as shown is of cylindrical shape, designed to be inserted into the length of pipe or conduit, through which the compressed air flows, adjacent to the regulating or supply valve of the engine, pump, or other machine to be operated, the said chamber having at one end a cock *b* for shutting off the air supply, and at the other end a pocket *c* into which a thermometer *d* can be inserted for enabling the temperature of the passing air current to be ascertained so that it can be controlled.

e is an upward branch or extension on the chamber *a* provided with a hinged lid *f* which serves to close the mouth of the said extension and to afford access to the interior of the chamber *a*, the said lid being provided with a glass panel *g* for inspection purposes and with a locking catch *h*. Instead of this hinged lid, a screw plug with a glass panel can be inserted into the mouth of the said extension.

i is a burner of the oil vaporizing type which is fixed within the chamber *a* and provided with a nozzle *j* through which the vaporized oil flows, the fuel being supplied through the pipe *k* and the flow regulated by a suitable valve or cock *l*. The pipe *k* has in its length a vaporizer *n* in such a position that the jet of flame which burns at the nozzle *j* will impinge upon the said vaporizer and maintain the same in a heated condition when the burner has been started.

o is a dish or tray arranged beneath the burner for containing oil or spirit for the initial heating of the said burner. The vaporizer *n*, on the face which meets the incoming air, is provided with a shield *p* which may be conical, as shown, or circular, (the said shield being advantageously made of strong steel wire gauze or netting) for directing the air around the burner where it mixes with the heated gases due to combustion; this shield by becoming hot tends to promote vaporization.

The oil fuel is preferably supplied to the burner *i* from an open tank arranged at a sufficient height above the apparatus to give an excess pressure to the effluent oil of, say, 20 lbs. per square inch above the pressure of the compressed air being treated. This is easily arranged underground where the necessary head of 1 foot for each .347 lb. per square inch can readily be obtained. For operation on the surface the apparatus can be arranged as shown in Fig. 1, the oil being contained in a closed tank *q* connected to the air supply pipe by a branch pipe *r* so that the fuel is under the same pressure as the compressed air in the air conduit, while the tank *q* is itself raised, say, about 58 feet above the apparatus, which head will be sufficient for the required excess pressure. Or, the whole of the required pressure to the surface of the oil, in an inclosed tank supplying the burner *i* with fuel, can be provided by a supplementary air compressing device, assisted or not by the compressed air from the air conduit.

In preparing the apparatus for use the

lid *f* is opened and a few spoonfuls of petrol or like spirit is introduced into the tray *o* and ignited to initially heat the vaporizer *n* as also the whole of the burner *i* and the pipe connecting the two. After about two minutes the lid *f* is closed and the oil valve *l* partially opened; directly indications through the inspection glass show the vaporizer to be at work the air cock *b* is opened, as is also the regulating or supply valve of the engine, pump or other machine to be worked by the compressed air. The flame caused by the combustion of the vaporized oil in the air chamber raises the temperature of the compressed air to a degree dependent on the quantity of oil consumed, the thermometer *d* enabling the temperature of the air to be regulated. The effect of such heating is to increase the volume of the air in the relation of 2 to 1 for an increase of 490° F., or *pro rata* for any other temperature, and such increase in volume proportionately decreases the amount of compressed air required for the working of the engine, pump or other machine. It is found in practice that the cost of thus increasing the energy possessed by the compressed air is much lower than that of effecting such augmentation by an initial compression of the air, while at the same time the advantages as regards non-freezing are obtained.

Although the products of combustion will be discharged into the atmosphere, the percentage of vitiated air relatively to the main bulk of the air is so small that its presence is of no consequence.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination with an air-main having a heating chamber, of an oil vaporizer arranged within said chamber, a shield arranged in front of said vaporizer for directing the incoming air around the same, and an oil vapor burner receiving fuel through said vaporizer and the flame from which is adapted to heat said vaporizer.

2. The combination with an air-main having a heating chamber, of an oil vaporizer arranged within said chamber, a conical shield for directing the incoming air around said vaporizer and an oil vapor burner receiving fuel through said vaporizer and the flame of which is adapted to heat said vaporizer.

3. The combination with an air-main having a horizontally disposed heating chamber provided with an opening, and a door for covering said opening, of a vaporizer arranged in said chamber beneath said door, an oil vapor burner receiving fuel through said vaporizer and the flame from which is adapted to heat said vaporizer, a shield provided on said vaporizer for directing the incoming air around the same, and a tray arranged adjacent to said vaporizer adapted to contain a heating substance for initially heating said vaporizer.

BENJAMIN ANGWIN.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."