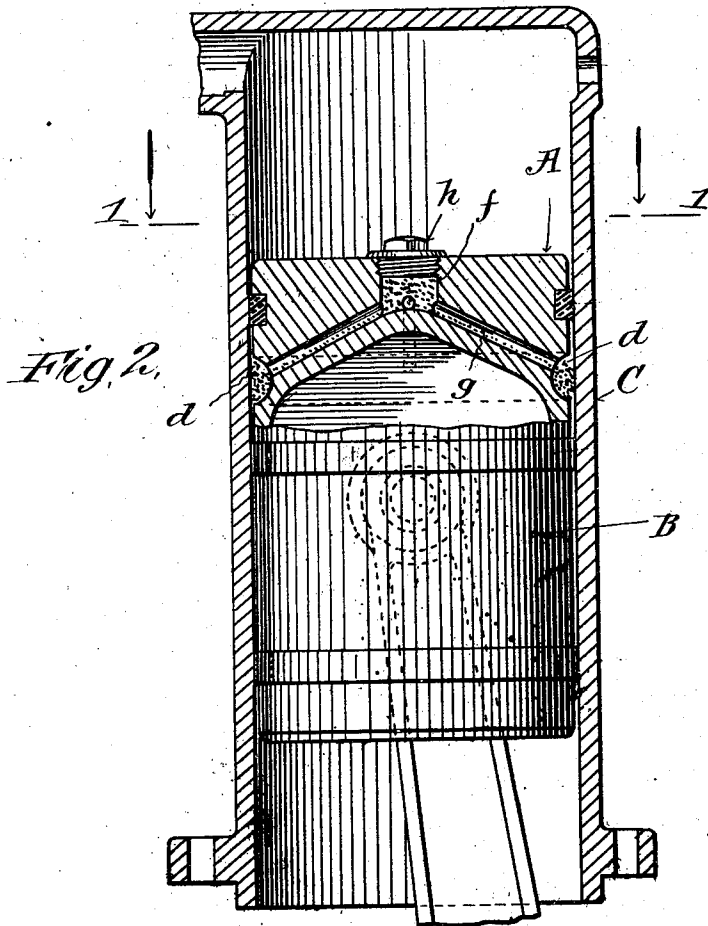
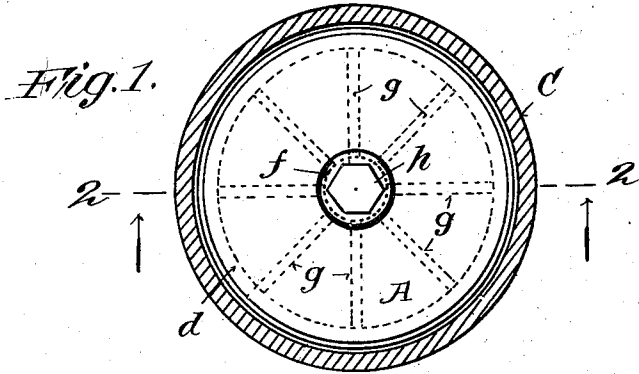


C. S. BAVIER.
LUBRICATING DEVICE.
APPLICATION FILED MAR. 1, 1911.

1,014,744.

Patented Jan. 16, 1912.

3 SHEETS—SHEET 1.



Witnesses:
W. M. Benjamin
H. Brown

Charles S. Bavier Inventor
By *Walter Brown* Attorney

C. S. BAVIER.
LUBRICATING DEVICE.
APPLICATION FILED MAR. 1, 1911.

1,014,744.

Patented Jan. 16, 1912.

3 SHEETS—SHEET 2.

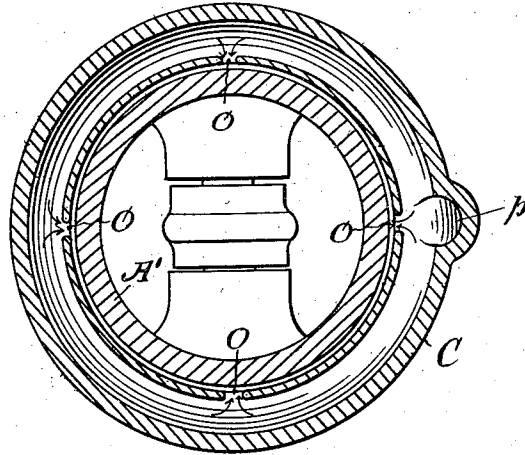


Fig. 4.

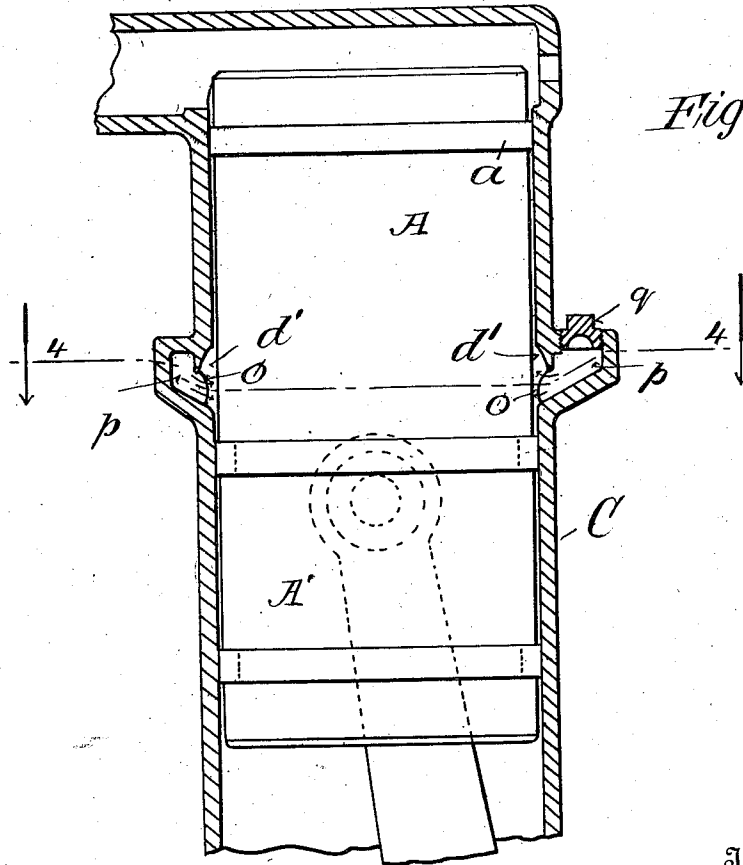


Fig. 3.

Witnesses:
W. H. Brown
H. P. Brown

Inventor
Charles S. Bavier
By his Attorney
Walter Brown

C. S. BAVIER.
LUBRICATING DEVICE.
APPLICATION FILED MAR. 1, 1911.

1,014,744.

Patented Jan. 16, 1912.
3 SHEETS—SHEET 3.

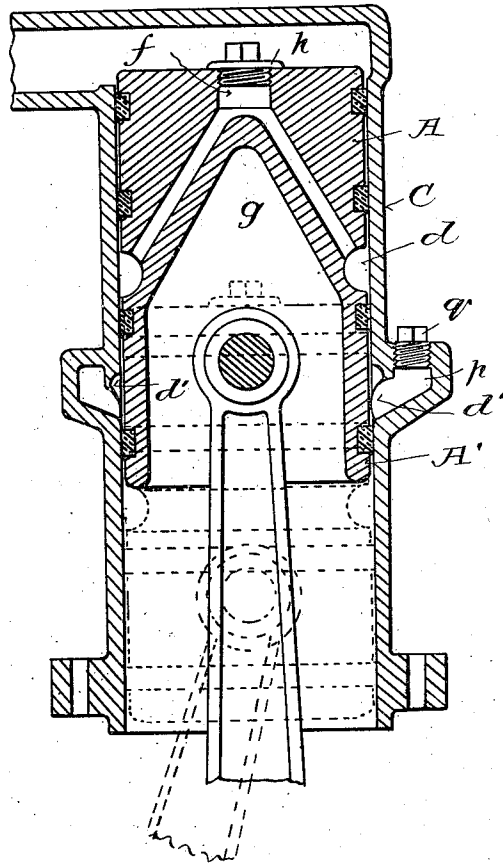


Fig. 5.

Witnesses:
Wm. J. Simpson
H. Brown

Inventor
Charles S. Bavier
By his Attorney
Walter Brown

UNITED STATES PATENT OFFICE.

CHARLES S. BAVIER, OF NEW YORK, N. Y.

LUBRICATING DEVICE.

1,014,744.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Application filed March 1, 1911. Serial No. 611,616.

To all whom it may concern:

Be it known that I, CHARLES S. BAVIER, a citizen of the United States, and a resident of the borough of Manhattan, in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Lubricating Devices, of which the following is a specification.

This invention relates to improvements in lubricating devices.

More particularly it is the purpose of the invention to provide devices for applying non-fluid, including non-liquid, lubricants, such as graphite, mica, metallic alloys and other substances possessing suitable properties for the lubrication of cylinders, pistons and other parts of machines, and which are capable of resisting high temperatures.

In applying the invention, I provide a peripheral recess to receive the lubricating material, and which recess I term a tumbling chamber, and of course, there may be more than one such chamber, although usually one is sufficient. This chamber is filled to the proper degree with the lubricating material, which is granulated or powdered to the proper degree of fineness, and in order to maintain said tumbling chamber properly full, I preferably connect it with a reservoir containing the lubricating substance, so that said substance will feed from the said reservoir to said tumbling chamber, and will keep said tumbling chamber properly, and not too compactly, filled with said lubricating substance for a considerable length of time, without requiring to renew the supply of lubricating substances. Said tumbling chamber may be formed in the piston or the cylinder, and I can provide both the piston and the cylinder with a tumbling chamber. The motion of the piston and the friction of the particles of the substance on the wall of the cylinder, of the tumbling chamber, and on each other, will, as it were, tumble said particles over and over, and their attrition, as well on the wall of the cylinder and chamber as against each other, will apply to the said wall of the cylinder and periphery of the piston a film of said substance, which will effectually smooth and even polish it, and be a most effectual substitute for the ordinary liquid or fluid lubricant.

My invention further provides for the automatic regulation of the amount of lubri-

cation according to the work done by the engine, for when the piston is reciprocating rapidly the attrition of the particles and the application of the film to the cylinder wall and piston will be more rapid than when the piston is reciprocating more slowly. Manifestly, also, if the cylinder is arranged horizontally, the attrition of the particles will be greatest on the underside of the cylinder, and this is where, in such cases, there is the greatest need of lubrication.

Referring to the drawings, which accompany the specification, Figure 1, is a transverse section, and Fig. 2 is a longitudinal section of the invention applied to the piston of an internal explosive engine, the various valve mechanisms and other parts, which are not part of this invention, being omitted from the drawings. Fig. 3 is a longitudinal section, partly broken, showing a tumbling chamber applied to the wall of the cylinder, and Fig. 4 is a transverse section on the irregular line 4-4 of Fig. 3. Fig. 5 is a longitudinal section showing a tumbling chamber on the piston and on the cylinder of an engine.

Referring to Figs. 1 and 2, the piston A, B, is of the usual construction. In the periphery of said piston, A is the tumbling chamber *d*, which is preferably a peripheral groove or recess around said piston. As hereinbefore stated, said tumbling chamber constitutes a chamber for granular or powdered non-fluid lubricating substance, and I prefer to connect said tumbling chamber with the reservoir *f* by passages *g*. Said reservoir *f* is closed by any suitable closure, as screw cap *h*, and said chamber may be of any size and shape, and larger or smaller than indicated in said Fig. 2, and located at any convenient place in said piston A. The wall of said tumbling chamber *d* is preferably inclined or curved in cross section to aid in forcing or wedging the particles of the lubricating substance against the wall of cylinder C as said piston A reciprocates. Said tumbling chamber will be preferably filled only to such degree that the particles of said substance are more or less mobile in said tumbling chamber, and, as said piston reciprocates, certain of said particles will be pressed into contact with the wall of said cylinder C, and the attrition of said particles with said wall and with each other, as also with the wall of said tumbling chamber, will grind said particles, and there will

be produced a fine film of the substance of said particles all over the wall of said cylinder within the limits of the stroke of said piston, and said cylinder will be effectually lubricated without danger of carbonization. As the particles in said tumbling chamber wear down, more particles will feed from the reservoir to the tumbling chamber.

Referring to Figs. 3 and 4, the tumbling chamber d' is formed in the wall of cylinder C and preferably as a recess or groove on the inner side of said wall, and with curved or sloping walls to aid in forcing or wedging the particles of the lubricant against the piston A, A'. Said tumbling chamber d' is preferably connected with a reservoir p for the lubricating substance, by ports o . There may be one or more reservoirs for the lubricating substance, and the said reservoir or reservoirs are preferably, but not necessarily, formed in a boss or bosses integral with said cylinder C. One or more suitable orifices, closed by any suitable closures q may be provided for filling said reservoir or reservoirs. It will be clear from the description and explanations hereinbefore given, that as the piston reciprocates the attrition of the particles on each other, on the walls of the tumbling chamber d' and on the surface of the piston will result in applying a thin coating or film of the lubricating substance to the piston and cylinder wall, whereby excellent lubrication will be attained, and it will also be evident that the amount of lubrication will be automatically regulated according to the work done by the engine.

Referring to Fig. 5, the engine is provided with the tumbling chamber d in the piston A, A', and with the tumbling chamber d' on the wall of the cylinder C, the arrangement of said tumbling chambers, and their connection with their respective reservoirs being preferably as hereinbefore described in connection with Figs. 1 and 2, and with Figs. 3 and 4. The operation of the devices will be clear from the explanations hereinbefore given.

It will be evident that the tumbling chambers may be used without the reservoirs, since the tumbling chambers contain sufficient lubricating material to properly lubricate the engine for considerable spaces of time, and claims are therefore hereinafter inserted to cover the invention both with and without reservoirs.

Now having described my improvements, I claim as my invention:

1. In combination with a piston engine, a tumbling chamber containing loose and movable particles of non-fluid lubricating material adapted to be tumbled about by the movements of the piston, substantially as described.

2. The combination with the cylinder and piston of an engine, of a tumbling chamber and loose movable particles of non-fluid lubricant therein adapted to be tumbled about by the movement of said piston, and said tumbling chamber having walls adapted to induce tumbling motions in the particles of said lubricating material, substantially as described.

3. The combination in an engine of a cylinder and piston, a tumbling chamber in said piston, and a reservoir for non-fluid lubricant operatively connected with said tumbling chamber, substantially as described.

4. The combination with a piston and cylinder, of a tumbling chamber, a reservoir for non-fluid lubricant operatively connected with said tumbling chamber, and a closure for said reservoir, substantially as described.

5. The combination with a piston and cylinder, of a tumbling chamber in the cylinder, a reservoir for non-fluid lubricant operatively connected with said tumbling chamber, and a closure for said reservoir, substantially as described.

6. The combination with a piston and a cylinder of tumbling chambers on said piston and cylinder adapted to contain non-fluid lubricant, and having walls adapted to induce motion in the particles of said lubricant, substantially as described.

7. The combination with a piston and a cylinder of lubricating chambers on said piston and cylinders, having walls adapted to induce tumbling motion in the particles of the lubricating material, and reservoirs for non-fluid lubricating material operatively connected with said chambers, substantially as described.

Signed at New York city, in the county of New York and State of New York this 23d day of February A. D. 1911.

CHARLES S. BAVIER.

Witnesses:

G. W. HOPKINS,
WALTER Y. HARRIS.