

(No Model.)

F. E. GALLOUPE.

STEAM OR OTHER HOT GAS CYLINDER.

No. 333,294.

Patented Dec. 29, 1885.

Fig. 1.

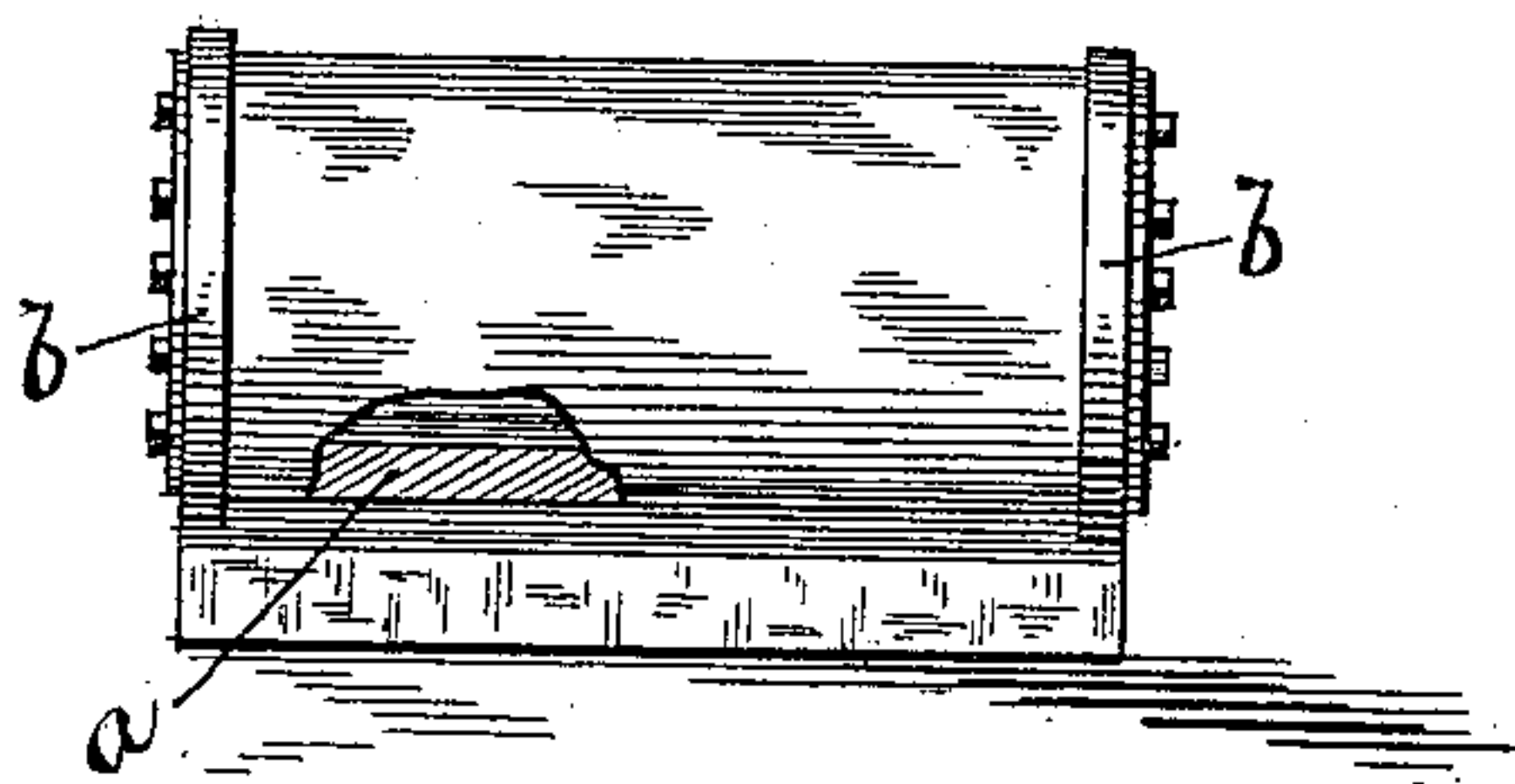


Fig. 2.

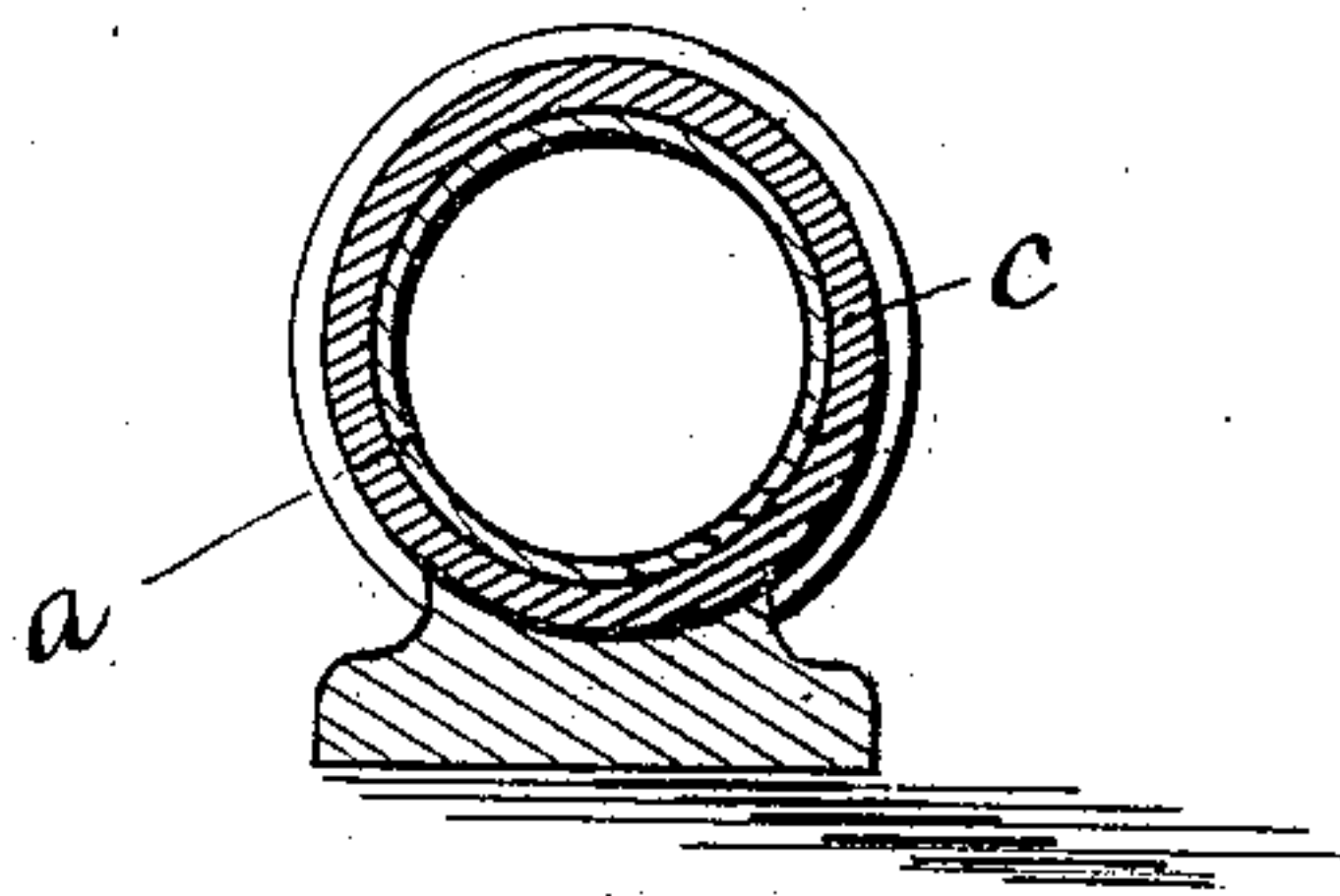


Fig. 3.

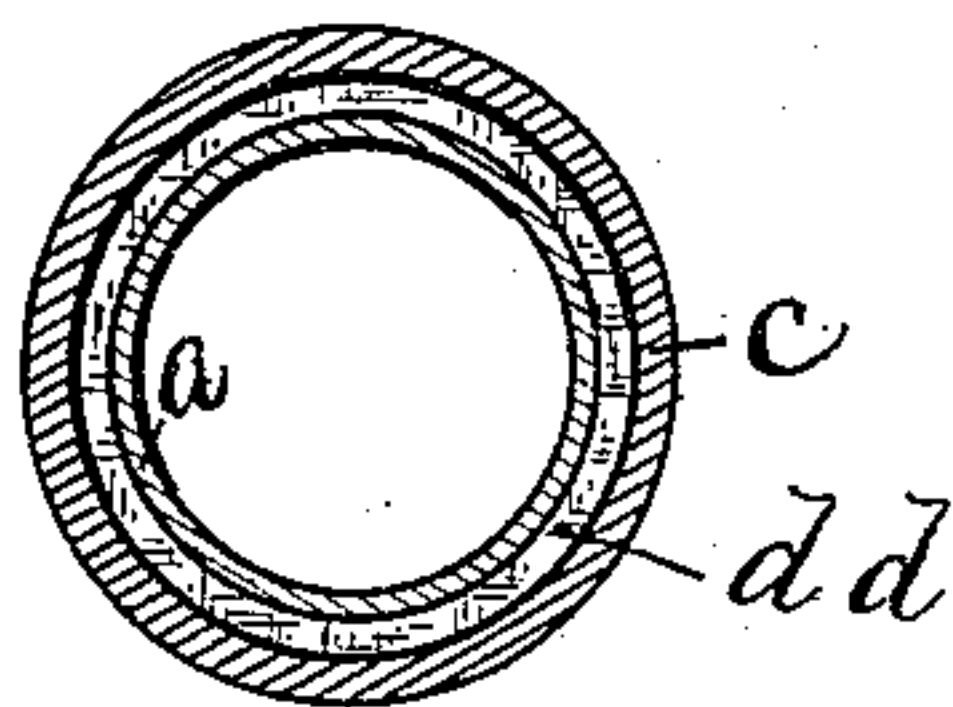
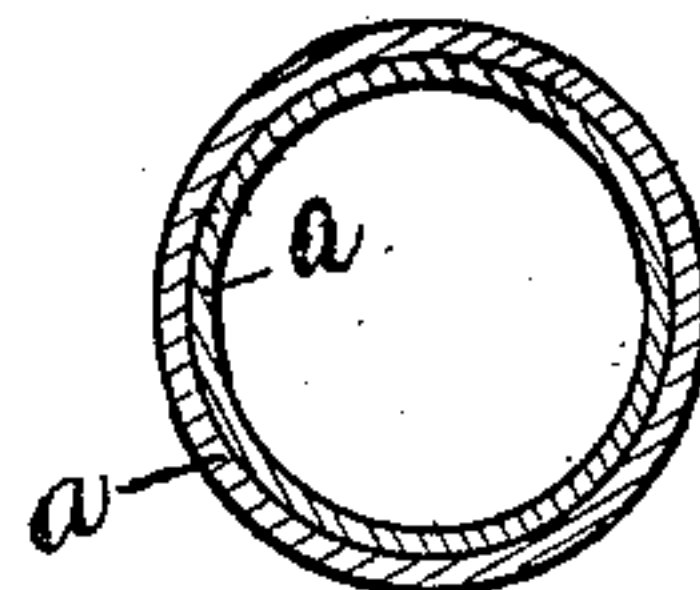


Fig. 4.



Witnesses:

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STEAM OR OTHER HOT-GAS CYLINDER.

SPECIFICATION forming part of Letters Patent No. 333,294, dated December 29, 1885.

Application filed April 6, 1885. Serial No. 161,379. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS E. GALLOUPE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Steam or other Hot-Gas Cylinders, &c., of which the following is a specification.

My invention relates to that portion of a steam, hot-air, or gas engine in which the gas or working-fluid is confined or expanded, usually called in engines the "cylinder," and, in general, to any vessel used for confining steam or other gas; and it consists in the application of a compound one of the ingredients in which is silicic acid, common examples of which are the substances glass and porcelain for the material of the cylinder or vessel, in whole or in part, combined with an air-space or compressible material, as will be hereinafter fully described. It is well known that large losses occur in such cylinders or receptacles, especially when steam or hot gas is used expansively, by the condensation of a portion of such gas, which comes in contact with the internal surfaces of the cylinder or receptacle, owing to the good conductivity of the walls of the vessel, by reason of which the heat of the steam or other hot gas is conducted away to and through the receptacle and a portion condensed in consequence, which diminishes the available power or heat to be obtained from the working-fluid.

The accompanying drawings illustrate my invention.

Figure 1 represents a cylinder of glass or other compound containing silicic acid provided with iron heads. Fig. 2 represents the compound used as a lining to a cast-iron cylinder. Fig. 3 shows the compound used as a lining, having rings of rubber or other elastic substance around it between it and the casting. Fig. 4 shows two concentric layers of the compound.

Similar letters refer to similar parts throughout the several views.

a represents the compound forming the barrel of the cylinder in Fig. 1, and composing the lining of a cylinder in Figs. 2, 3, and 4.

b represents the heads of cast iron.

c represents a cast-iron cylinder.

d d, Fig. 3, represent rings, of rubber or other elastic substance, wrapping around the

lining *a*, between it and the casting *c*, and which can be made either continuous or inclosing an air-space around the lining *a*, the purpose of which is to prevent breakage of the lining by unequal expansion of the lining and casting when heated, and to further aid in preserving the steam or other gas from loss of heat by its non-conducting quality.

Instead of using this compound in either of the ways above stated, I may apply it as a coating direct to the internal surfaces of a cylinder or other gas-receptacle; or it may be blown in, as glass-blowers blow glass, to fit a mold, as shown in Fig. 2, or employed in two or more layers, Fig. 4, with or without an air-space between the layers, or coated internally or externally so as to form a jacket upon a steam-cylinder or steam-pipe, as deemed advisable. It is evident that not only the cylinder-barrel, but also the cylinder-heads and piston-surfaces may be in like manner covered.

The losses due to condensation in the present iron steam-cylinders are very large, amounting sometimes to fully one-half the weight of steam employed. The conductivity of a compound such as has been above described is less than one-thirtieth part that of iron; hence a corresponding saving of heat by its use results.

The specific compound I may employ may contain, besides silicic acid, one or several of the other chemical elements heretofore mentioned. For example, a suitable compound is one composed of two chemical equivalents of potassium and one of oxygen united to three of silicic acid, (SiO_2), combined with one chemical equivalent of calcium and one of oxygen united to three of silicic acid in the proportion of two of the former to three of the latter, the chemical formula of which is $2(\text{K}_2\text{O} \cdot 3\text{SiO}_2) \cdot 3(\text{CaO} \cdot 3\text{SiO}_2)$; but the proportions and the other elements used may be varied to obtain special qualities in special cases—as, for instance, hardness of surface, toughness or elasticity, a compound unacted upon by high temperatures of the steam or other gas, one readily molded to any form desired, &c.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-cylinder or other gas-receptacle, the combination of a compressible ma-

terial, to prevent undue strain or breakage of the compound by expansion, with a compound composed in part of silicic acid, substantially as described, and for the purpose set forth.

- 5 2. In combination with a steam-cylinder or other gas-receptacle, *c*, having a glass or other lining, *a*, composed in part of silicic acid, set-

off rings *d d*, by which a space is formed between the metal of the cylinder and the said lining, substantially as described.

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Witnesses:

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