

958,905.

Patented May 24, 1910.

2 SHEETS—SHEET 1.

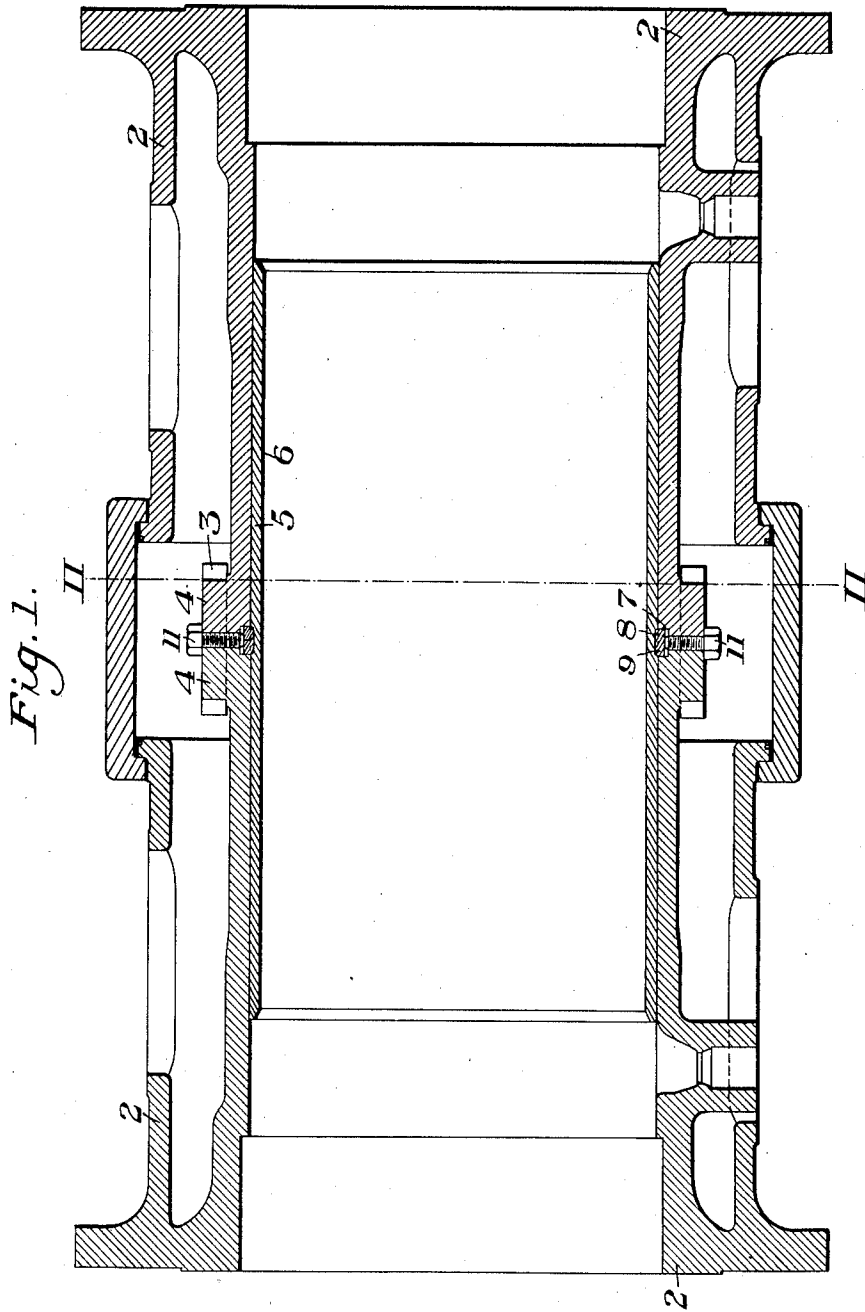


Fig. 1.

WITNESSES

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 ENGINE CYLINDER.  
 APPLICATION FILED DEC. 31, 1908.

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2 SHEETS—SHEET 2.

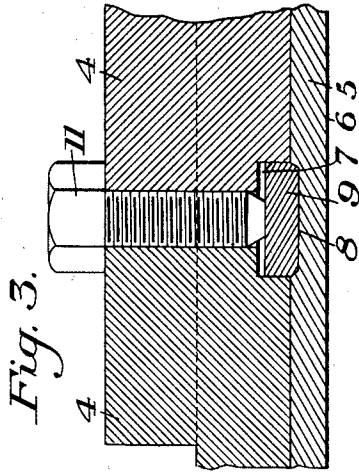


Fig. 3.

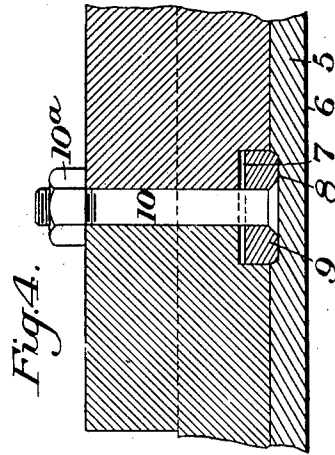


Fig. 4.

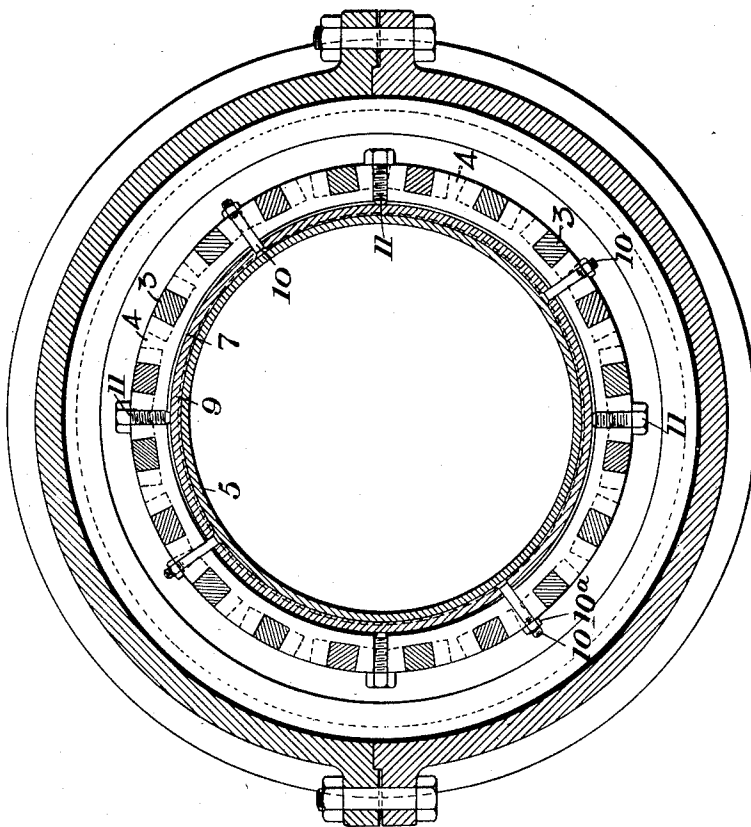


Fig. 2.

WITNESSES

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# UNITED STATES PATENT OFFICE.

GEORGE J. BRYEN, OF DUQUESNE, PENNSYLVANIA.

## ENGINE-CYLINDER.

958,905.

Specification of Letters Patent. Patented May 24, 1910.

Application filed December 31, 1908. Serial No. 470,244.

To all whom it may concern:

Be it known that I, GEORGE J. BRYEN, of Duquesne, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Engine-Cylinders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:—

Figure 1 is a longitudinal section showing a water-cooled gas engine cylinder constructed in accordance with my invention; Fig. 2 is a cross section of the same taken on the line II—II of Fig. 1; Figs. 3 and 4 are detail sectional views, on a larger scale, showing the improved means for securing the removable bushing in the cylinder forming part of my invention.

My invention relates to the construction of engine cylinders, more especially the larger sizes of such engines and it more particularly relates to the construction of gas engine cylinders of the type using blast furnace gases.

Heretofore in engine cylinders having bushings, great difficulty has been found in holding the bushings securely in place in the cylinders. Trouble has also been had in the operation of such engines, owing to the expansion of the bushings in the cylinders, which is caused by the great difference in the temperature of the bushings and the cylinder, particularly with gas engine cylinders. With such cylinders it has also been found difficult to provide a bushing having a suitable wearing surface and the soft bushings rapidly become cut and scored on account of the difficulties met with in lubricating such cylinders.

My invention is designed to overcome these difficulties and the invention consists in providing improved means for securing the bushings in such cylinders and to secure the bushings in the cylinders in such manner that they can be removed and replaced without dismantling the cylinders, as is the case in the usual construction and that will permit of the free expansion lengthwise of the bushing in the cylinder.

The invention further consists in providing the cylinder with a cast iron bushing having a chilled inner or wearing surface.

In the drawings, I show a water jacketed gas engine cylinder cast in two transversely divided halves 2, 2 which are secured together by suitable links 3. The flanges 4, 4

on the contacting ends of the cylinder halves are slotted and the links 3 are shrunk or are driven down over the pairs of lugs formed by the slotting of these flanges so as to rigidly hold the two parts of the cylinder together. The cylinder formed by the parts 2, 2 as shown, is provided with double walls in order to form a water-jacket for cooling the cylinder while the engine is in operation. Secured on the interior of the cylinder at a point intermediate of its length is a removable bushing 5 which is made of cast iron and the inner surface 6 of which is chilled. By so forming the bushing, it is provided with a very hard wearing surface which can be accurately machined to the desired diameter and which can be highly polished, preferably by grinding, so as to give a hard smooth wearing surface in the cylinder of the engine.

The inner surface of the cylinder, formed by the parts 2, 2, is provided with a recess or groove 7 and the outer surface of the bushing 5 is provided with a peripheral groove 8 which registers with the groove 7 in the engine cylinder when the parts are assembled together in the right location. The groove 8 in the bushing or lining 5 of the engine has tapering side walls for a purpose described later.

Mounted in the groove 7 in the cylinder is a split or segmental ring 9 preferably formed of hardened steel and this ring is secured to the cylinder by means of the adjusting bolts 10, a series of which are provided on the periphery of the cylinder in order to draw and hold the ring 9 entirely within the recess 7 so that the inside surface of the ring will not project beyond the surface of the bore of the cylinder. After the ring 9 has been placed in position in the recess or slot 7 and has been drawn back into its recess by means of the bolts 10 and the adjusting nuts 10<sup>a</sup> until the ring 9 is entirely within the recess 7, the bushing 5 is placed in the position shown on the inside of the cylinder. When in this position, the groove or recess 8 in the periphery of the bushing will register with the groove 7 in the cylinder. The nuts 10<sup>a</sup> on the bolts 10 are then slackened so as to permit the ring 9 being moved in the slot 7. The ring 9 is then moved outwardly in the slot 7 by means of the ring adjusting bolts 11, a series of which are provided on the periphery of the cylinder for this purpose, as is clearly shown

in Fig. 2. By adjusting the screw threaded bolts 11, the ring 9 is forced into the position shown in the drawings and when in this position, the tapering side walls of the slot or groove 8 in the bushing will contact with the correspondingly tapered edges of the ring 9 and will securely lock and hold the bushing 6 in place in the cylinder and prevent its movement longitudinally relative to the cylinder. The bushing being secured at the middle of its length, the ends of this bushing are free to expand in the cylinder.

The advantages of my invention are many and will be apparent to those skilled in the art. By my improved means for securing bushings in the cylinders there is no possibility of movement of the bushing in the cylinder. The bushings can be easily and quickly removed and replaced in the cylinder should occasion arise. By providing an engine cylinder with a cast iron bushing having a chilled inner surface, an improved wearing surface for the engine cylinder is obtained. The apparatus is simple and is easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from my invention.

While my invention is shown as applied to a gas engine cylinder, I wish it to be understood that it is equally applicable to steam or other types of motor cylinders.

I claim:—

1. An engine cylinder having a bushing therein, a peripheral groove in the outer surface of the bushing, a groove in the inner surface of the cylinder wall registering with the peripheral groove in the bushing, and an annular ring in said grooves for holding the bushing in place in the cylinder; substantially as described.

2. An engine cylinder having a bushing removably mounted therein, a peripheral groove in the outer surface of the bushing, a groove in the inner surface of the cylinder wall registering with the peripheral groove in the bushing, an annular ring in said grooves for holding the bushing in place in the cylinder, means for holding the ring in the groove in said bushing and means for

withdrawing the ring from the groove in said bushing; substantially as described.

3. An engine cylinder having a removable bushing therein, a peripheral groove in the outer surface of the bushing, a groove in the inner surface of the cylinder wall registering with the peripheral groove in the bushing, means for forcing the ring into engagement with the walls of the groove in said bushing, and means for withdrawing and holding the ring out of engagement with the walls of the groove in said bushing; substantially as described.

4. An engine cylinder having a bushing therein, a peripheral groove in the outer surface of the bushing, a groove in the inner surface of the cylinder wall registering with the peripheral groove in the bushing, an annular ring in said grooves for holding the bushing in place in the cylinder, and means for withdrawing the ring from the groove in said bushing; substantially as described.

5. An engine cylinder having a bushing removably mounted therein, a peripheral groove in the outer surface of the bushing, a groove in the inner surface of the cylinder wall registering with the peripheral groove in the bushing, an annular ring in said groove for holding the bushing in place in the cylinder, means for holding the ring in the grooves in the bushing and cylinder, and means for withdrawing the ring from one of said grooves into the other of said grooves; substantially as described.

6. An engine cylinder having a bushing removably mounted therein, registering annular grooves in the contacting surfaces of the bushing and the cylinder wall, an annular ring in said grooves for holding the bushing in place in the cylinder, and means for withdrawing the ring from one of said grooves into the other of said grooves; substantially as described.

In testimony whereof, I have hereunto set my hand.

GEORGE J. BRYEN.

Witnesses:

FRANK PHILLIPS,  
FRANK McWILLIAMS.