Oct. 29, 1940. D. J. WHERRY 2,219,798

PISTON STABILIZER

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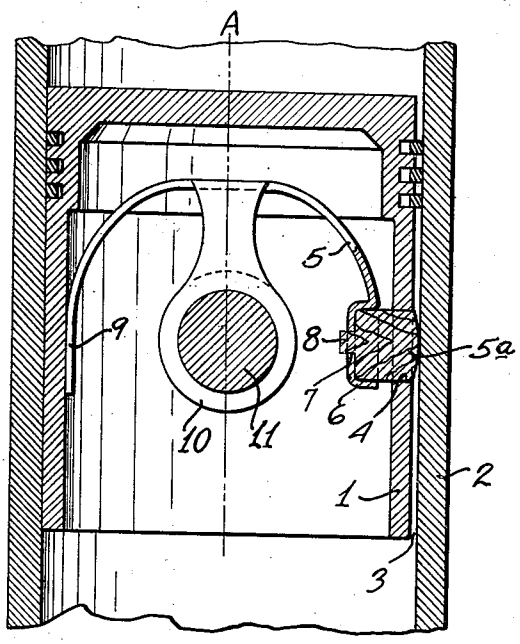


FIG. 1.

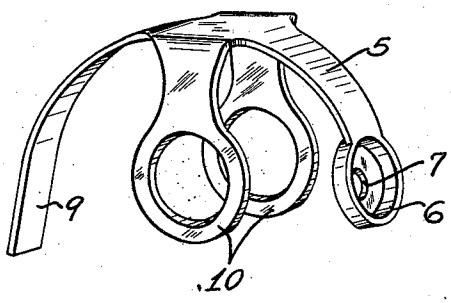


FIG. 2.

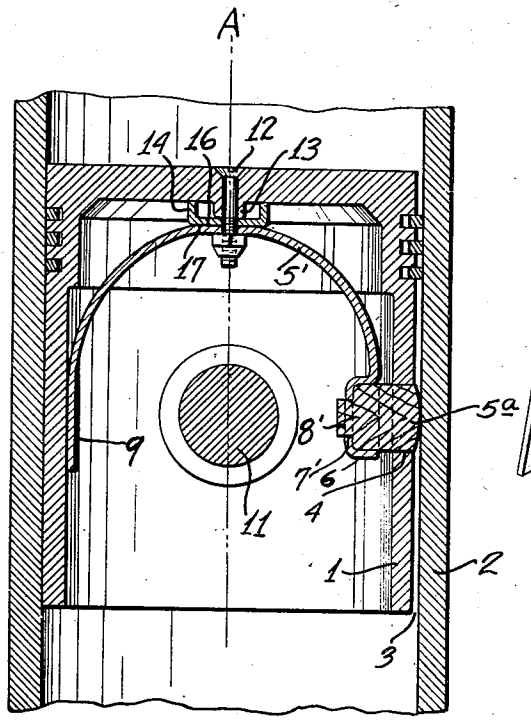


FIG. 3.

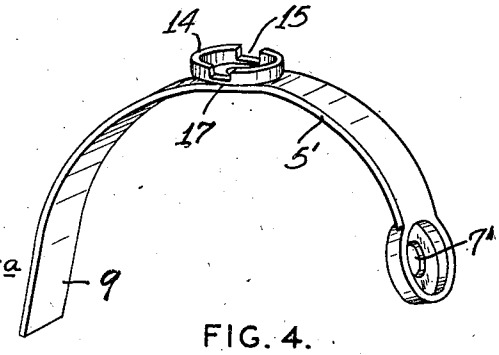


FIG. 4.

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PISTON STABILIZER

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6 Claims. (Cl. 309—5)

This invention relates to certain new and useful improvements in piston stabilizers, the peculiarities of which will be hereinafter fully described and claimed.

The main objects of my invention are to provide means first, for securely holding a wooden plug at the end of an arcuate spring adapted to be supported in the vertical axis of a piston to exert a spring tendency outward on the plug projecting through an opening in the side wall of a piston; second, for assisting in holding the plug in the cup-shaped end of said spring; third, for avoiding any tendency of the plug to split under operation as a stabilizer; and other objects and features of construction hereinafter fully described and claimed.

Under continued use, a reciprocating piston in a cylinder is subject to wear that produces a lateral play of the piston that is known as "piston slap." Various means for avoiding this slap have been employed, and my present construction is an improvement over my previous Patent No. 2,063,210 dated December 8, 1936 for a Device for elimination of piston flutter. In my said prior patent the wooden plug has a cone-shaped recess cut in the rear base portion of the plug into which fits a matching projection from a flat spring mounted by its ends on the inner face of the side wall of a piston. A separate holding band embraces the wooden plug to prevent the plug from expanding or splitting.

My present invention is designed as an improvement over my prior construction as will be hereinafter fully described and claimed.

In the accompanying drawing in which like reference characters indicate corresponding parts,

Fig. 1 represents a vertical section through a piston having my improvements applied thereto and an enclosing cylinder for said piston;

Fig. 2, a detail perspective view of my spring cup and its support as shown in Fig. 1;

Fig. 3, a similar sectional view of Fig. 1 with another form of my spring-supporting means for mounting it in the piston; and

Fig. 4, a perspective view of this form of spring-supporting means for mounting it as shown in Fig. 3.

Referring to the drawing, the numeral 1 designates a suitable piston of an explosive engine and 2 its enclosing cylinder. The wear that occurs in such a pison and cylinder is indicated in exaggerated form at 3 for the purpose of illustration.

In the side wall of the piston is an opening 4 in which is mounted a wooden plug 5*a* having a rounded outer face to contact with the enclosing cylinder wall under a yielding outward tendency produced by an arcuate spring 5, preferably semi-circular, having on one end a cup-shaped receptacle 6 for the wooden plug which is snugly mounted therein. The walls of said cup are preferably integral with the spring and the edge of the rim walls is flush with the adjacent portion of the spring so as to embrace the inner end of the wooden plug and prevent its expansion or splitting under use.

A central opening 7 Fig. 2, is formed in the bottom of the cup, and a rearward projection 8 from said plug snugly fits in the same and assists in centering the plug in the cup and also assists in holding the fibers of the plug together to avoid splitting. The flat bottoms of the cup and plug are closely engaged.

In Fig. 3 this hole 7′ and matching rearward extension 8′ of the plug are shown larger than in Figs. 1 and 2, to embrace a greater portion of the wooden plug and hold it securely in the cup.

Referring particularly to Figs. 1 and 2, I provide means located in the vertical axis A of the cylinder to support the spring 5 so the cup-shaped end and contained plug will be disposed in operative position adjacent the opening 4 in the side wall of the piston. The plug fits slidingly in said opening so that its outer rounded face contacts with the enclosing cylinder wall, and the cup of the spring is held away from the inner wall of the piston a suitable distance to allow for the wear of the outer face of the plug. The opposite end 9 of the semicircular spring bears against the opposite side wall of the piston in both the Figs. 1 and 3. The means for supporting the spring so as to hold the cup and its plug in position as above described is shown in Figs. 1 and 2 as formed by eyelugs 10 extending vertically downward from the lateral edges of the spring 5 so that the eyes in said lugs engage the wrist pin 11, transversely mounted in the piston in the usual form. These lugs support the spring at a middle point thereof in which is located in the vertical axis A of the piston and hold the spring in operative position as above described. These eyelugs extend down on opposite sides of the usual pitman head which is mounted on the wrist pin in the usual manner but not shown.

Referring more particularly to Figs. 3 and 4, I have shown means for securing the arcuate spring in position comprising a clamping bolt 12

the head of which is countersunk in the upper face of the piston head and extends downward in the vertical axis A through the spring 5' and has a lock nut on its lower end. In some forms of pistons, there is a central downward projection 13 and this bolt passes through said projection as shown in Fig. 3. When such projection is present in a piston to which my spring is applied, I provide a cup-shaped washer 14 mounted on the bolt and having its rim disposed upward in order to bear on the lower face of the head of the piston. When such piston has a rib projection I provide notches 15, Fig. 4, in the rim of the washer to embrace this rib and allow the rim of the washer to bear against the head as shown in Fig. 3. The lower face 16 of the washer is flat and is firmly engaged by the upper flattened matching face 17 of the spring due to the clamping action of said bolt.

When such downward projection from the piston head is absent, the clamping bolt will hold the spring firmly against the under side of the piston with or without the spacing washer above described.

On account of the flattened surfaces in engagement between the washer and the spring as held by the clamping bolt, the construction shown in Fig. 3 having a semicircular spring, may dispense with the end of the spring contacting the piston wall opposite the cup and plug, and depend for its secure disposition upon the clamping bolt in the axis of the piston for holding it firmly to produce the outward spring tendency of the cup and its contained plug. However, the semicircular form of spring is preferred as the reaction of the end of the spring opposite the cup and plug, tends to assist the outward spring tendency of the same to effect operative yielding contact of the outer face of the plug with the enclosing cylinder.

I claim:

1. In a piston of the kind described provided with an opening through its side wall, a piston stabilizer comprising a leaf spring within said piston yieldably bearing at one point against said piston wall so that one end of the spring terminates adjacent said opening and is sprung outwardly of the piston thereat, means for supporting said spring intermediate its ends in said piston, a cup on said terminal end of the spring, and a wooden plug in said cup and extending through said piston opening.

2. In a piston of the kind described provided with an opening through its said side wall, a piston stabilizer comprising a bowed leaf spring supported intermediate its ends but free at one end to spring radially outwardly of the piston, a cup on said free end, and a wooden plug mounted in said cup and yieldingly thrust through said opening by said spring.

3. In a piston stabilizer adapted to be mounted within a piston and comprising an arcuate leaf spring fixed at one point inside said piston and provided with a cup at one end, whereby said cup is yieldingly thrust outwardly, said cup having an opening through its rear, and a wooden plug fitted within said cup and having a projection to snugly fit through said cup opening to limit splitting of said plug thereat.

4. In a piston having an opening through its side wall, a piston stabilizer mounted within said piston and comprising an arcuate leaf spring yieldably engaging one end against said piston wall and provided adjacent its other end with a cup disposed adjacent said opening, a wooden plug in said cup and normally projecting through said opening, and means in alignment with the vertical axis of the piston fixedly securing said spring to said piston thereat.

5. In a piston having a transverse rib on the underside of its head and having an opening through a side wall, a stabilizer comprising an arcuate spring within said piston and having a cup adjacent said opening, a clamping bolt through the vertical axis of said piston for securing the spring thereat against shifting, a cup washer on said bolt between said spring and piston and having a cut-out to receive said rib of the latter, and whereby the washer rim bears against the underside of the piston head, and a wooden plug mounted in said cup and pressed outwardly through said opening by the thrust of said spring.

6. In a piston having a side opening and adapted for movement in a cylinder, a piston stabilizer comprising an arcuate spring element adapted to be fixed and secured intermediate its ends within said piston, and provided at one end with an integral terminal cup having a central hole through its bottom, and a cylinder-engaging element held within said cup, and having a central boss at its rear to extend through said central hole of said cup and engage the enclosing periphery of said hole to prevent splitting of said cylinder-engaging element thereat.

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