

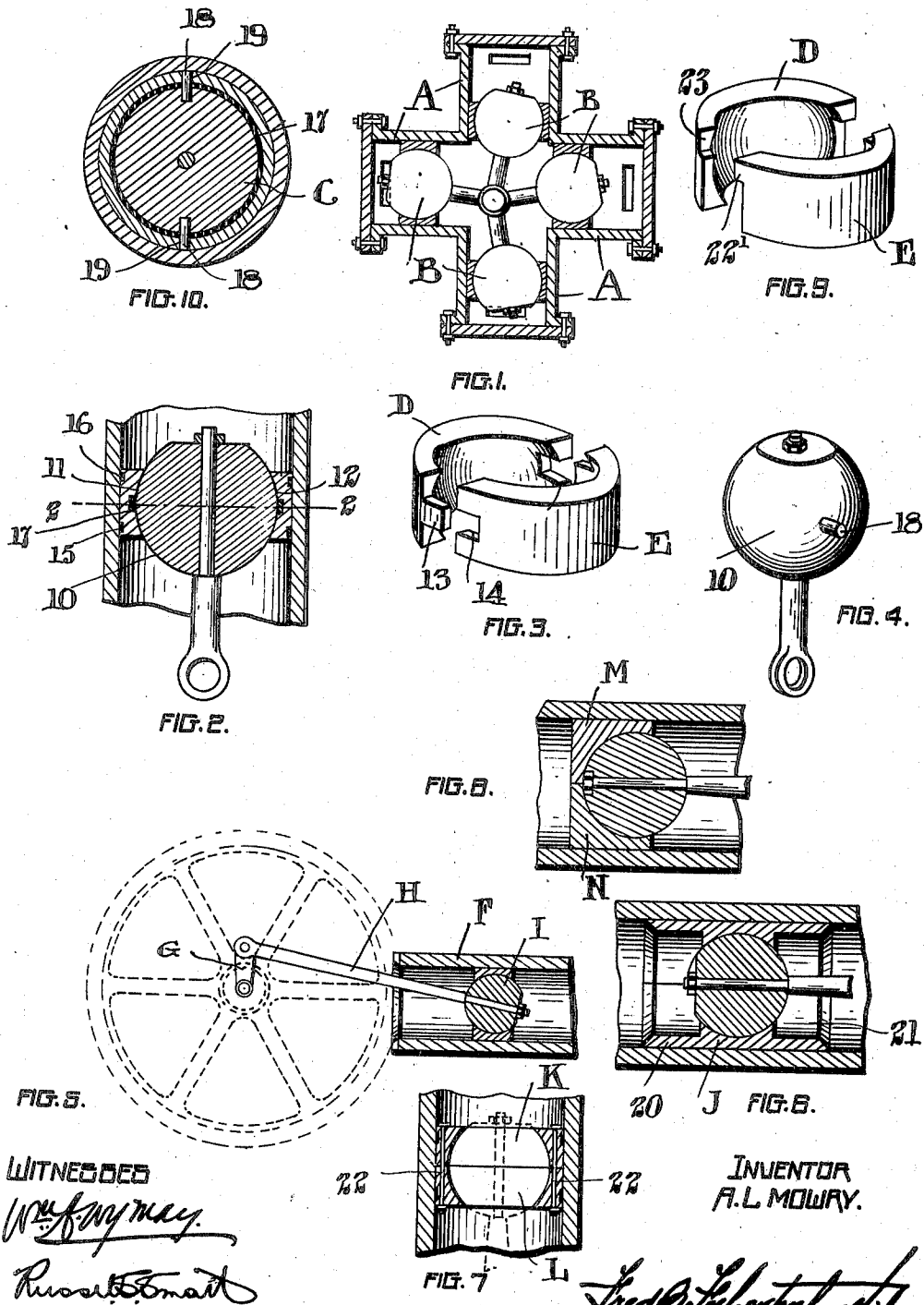
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PISTON.

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957,984.

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WITNESSES

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PISTON.

957,984.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT LAWRENCE MOWRY, of St. John, in the Province of New Brunswick, Canada, have invented certain new and useful Improvements in Pistons, of which the following is a specification.

This invention relates to improvements in pistons and the objects of the invention are to eliminate the ordinary form of articulated joint, to reduce the friction to a minimum, to provide for the ready removal of the packing shoes extending between the piston and the walls of the cylinder and to generally simplify the construction.

In an earlier Patent No. 858,617, I have described a form of engine with rotating cylinders employing tilting pistons, and the present invention may be used with advantage in said engine, but it is to be understood that the present invention is of general application and as well as being used in connection with steam engines may be employed with internal combustion engines.

In its construction the invention includes a head having spherically formed sides and divided shoes fitting between the sides of the cylinder and the head, all as hereinafter more fully set forth and described in the accompanying specifications and drawings.

In the drawings, Figure 1 is a vertical section through a set of the cylinders employed in my earlier invention with the improved form of pistons therein. Fig. 2 is an enlarged longitudinal section through a portion of the cylinder showing the piston. Fig. 3 is a perspective view of the shoes fitting between the head of the piston and the walls of the cylinder. Fig. 4 is a perspective view of the head of the piston and piston rod. Fig. 5 is a longitudinal section illustrating the invention applied to an internal combustion engine. Fig. 6 is a longitudinal section showing one alternative form of shoe. Fig. 7 is a sectional view through another alternative form of shoe. Fig. 8 is a sectional view showing a further alternative form of shoe. Fig. 9 is a perspective view of another alternative form of shoe. Fig. 10 is a section on the line 2—2, Fig. 2.

In the drawings, like characters of reference indicate corresponding parts in each figure.

As generally described, the invention may be said to consist of a piston head more or less spherical in form having a plurality of separable shoes fitting between the head and the sides of the cylinder, the said shoes being divided either longitudinally or transversely and being formed with inner spherical surfaces fitting the surface of the head.

Referring particularly to Figs. 1 to 4 and 10, A represents the rotating cylinders suitably mounted and supplied with expansive fluid, as explained in my earlier patent. B represents the pistons which rotate, as a whole, about a center eccentric to that about which the cylinders rotate. In accordance with the present invention these pistons are formed with the head C having the periphery formed with a spherical surface 10. In the embodiment illustrated in these figures, the head is substantially in the form of a ball, but it is not necessary that the spherical surface should be extended to this degree, the essential requirement being that the outer edge of the ball, where it contacts with the shoes should be spherically formed. D and E represent the shoes fitting between the piston head and the walls of the cylinder, and formed on the interior with spherical surfaces 11 and 12 corresponding to the surface 10 on the head. It is necessary to provide some means to prevent the passage of steam through the longitudinal joint between the shoe members, and in the embodiment illustrated in Figs. 1 to 4 and 10, each section is provided at one edge with a tongue 13 adapted to fit into a slot 14 in the opposite section, thereby forming a dovetailed joint. To further increase the tightness of the joint between the shoe section and the piston, and the walls of the cylinder, packing rings 15, 16 and 17 of usual form may be provided and in order to hold the cylinder head in place to prevent the tendency to turn on the axis of the piston rod, it is preferable to provide pins 18 on the head C fitting into suitable recesses 19 in the shoe members.

In the embodiment of the invention illustrated in Fig. 5, F represents the cylinder of an ordinary gas engine, G the crank, H the piston rod, and I the piston, which is of substantially the same form as illustrated in Figs. 1 to 4 and 10.

In the alternative form of shoe members shown in Fig. 6, the said shoe members J are provided with annular extensions 20 and 21 which extend along the sides of the cylinder and assist in holding the heads steadily in position.

In the form shown in Fig. 7, the shoe members K and L are annular in form and abut each other at substantially the center of the head and said members being retained together by suitable fastening means such as the bolts 22.

In the form shown in Fig. 8, the shoe members M and N overlap the top of the head and thus prevent the fluid pressure reaching the same.

The form of shoe members illustrated in Fig. 9, are the same, as those shown in Figs. 1 to 4, only the joints are formed by tongues 22 at the upper edge of one member fitting into a rabbet 23 at the upper edge of the opposite member.

It may be observed that the form of piston in which the outer end of the head is exposed to the fluid pressure has an advantage in that a certain amount of the fluid will find its way between the head and the shoes, thus tending to tighten the shoes against the cylinder and relieving the friction between the tilting head and the shoes. In this form also, the advantages of the tilting piston, as pointed out in my earlier patent, may be obtained.

As many changes could be made in the above construction, and many apparently widely different embodiments of the invention, within the scope of the claims, could be made, without departing from the spirit or scope thereof, it is intended that all

matter contained in the accompanying specifications and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:—

1. A piston having a head with a spherically formed side surface and segmental shoes fitting between the head and the walls of the cylinder and being formed with interlocking parts adapted to prevent the passage of steam in a longitudinal direction.

2. A piston having a head with a spherically formed side surface and segmental shoes fitting between the head and the walls of the cylinder, one of each pair of abutting parts of said shoes being formed with a circumferentially extending projection fitting into a corresponding recess formed in the other part.

3. A piston having a head formed with an outer spherical surface and longitudinally divided removable shoes extending between the head and the walls of the cylinder, and diametrically opposed pins in the head fitting into recesses in the shoes.

4. A piston having a head with a spherically formed side surface and segmental shoes fitting between the head and the walls of the cylinder, one of each pair of abutting parts of said shoes being formed with a circumferentially extending projection, fitting into a corresponding recess formed in the other part and packing rings extending between said shoes and the head.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALBERT LAWRENCE MOWRY.

Witnesses:

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