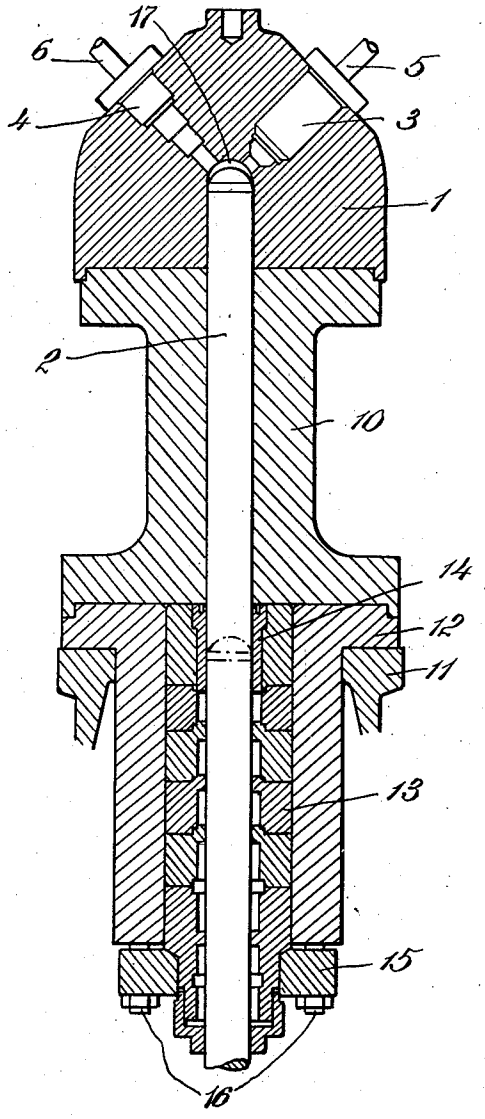
July 22, 1941. O. MINDER 2,250,164

HIGH PRESSURE CYLINDER

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Fig. 1.



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HIGH PRESSURE CYLINDER

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Fig. 2,

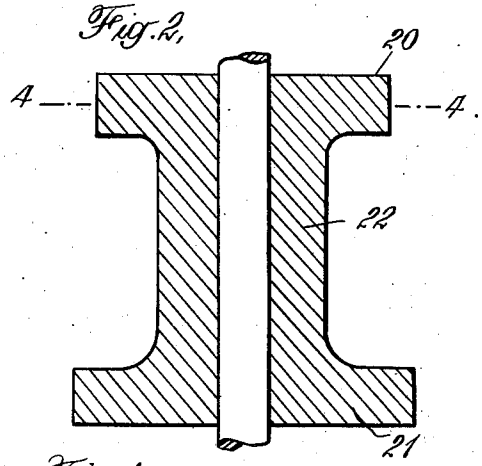


Fig. 3,

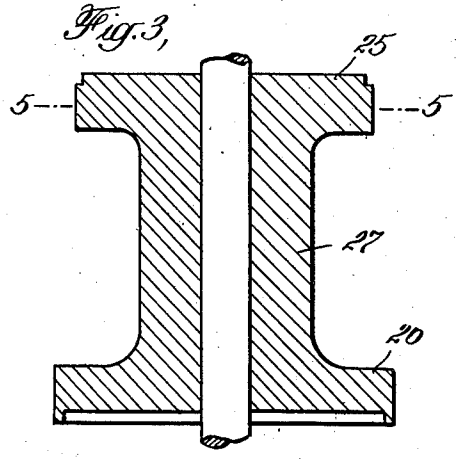


Fig. 4,

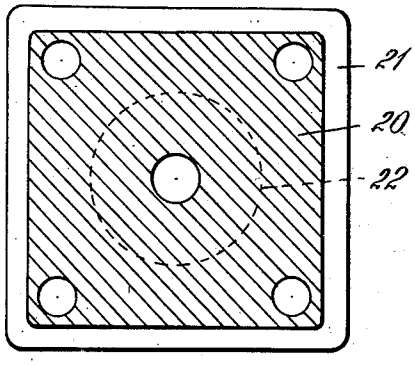


Fig. 5,

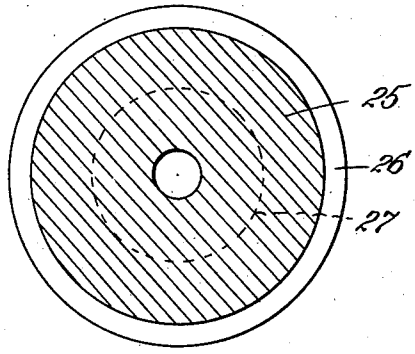


Fig. 6,

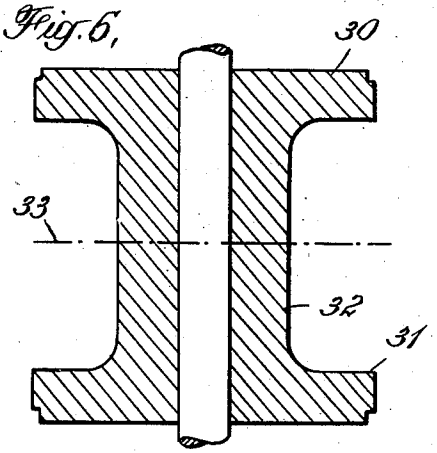
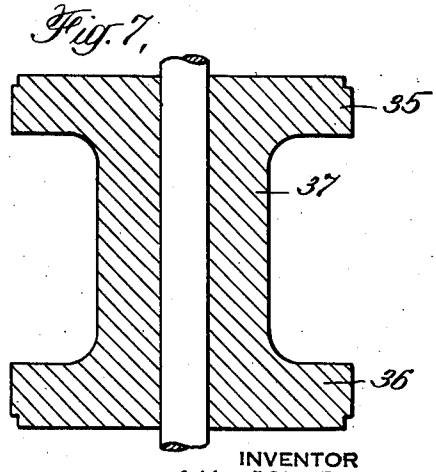


Fig. 7,



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HIGH PRESSURE CYLINDER

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Application October 20, 1939, Serial No. 300,405
In Switzerland October 27, 1938

3 Claims. (Cl. 309—2)

This invention relates to high-pressure cylinders, and particularly to cylinders of the type employing a single acting piston. The high pressure cylinder of the invention comprises at least two parts, one part being at the head-end where the fluid medium undergoing compression is subjected to the greatest pressure; the other part (hereinafter called the "low-pressure cylinder-portion") is connected to the head-end portion and extends to the vicinity of the lower dead point of the piston, the pressure in this portion of the cylinder being relatively low. The invention contemplates the provision of an improved cylinder for the compression of fluid media at pressures, for example, over one thousand atmospheres capable of resisting corrosion resulting from the conditions prevailing in certain portions of the cylinder.

Repeated attempts have been made to manufacture such compression cylinders, which are subject to high stresses, of steel which is suitable for tempering. However as these, without exception, for construction reasons show very great differences with respect to the cross sections and material aggregations or agglomerations cannot be avoided, whereby a tempering which is uniform and free from stresses is impossible, these attempts did not lead to the result expected. In accordance with the invention, therefore only that part of the working surface which is exposed to corrosion is made of steel suitable for tempering.

In subjecting certain fluid media to extremely high pressures in cylinders, there is a relatively rapid corrosion of the cylinder in the vicinity of the lower dead point of the piston caused by a corrosion phenomenon generally attributed to accumulated acid residues. The relatively low temperature and pressure at this part of the cylinder seem to produce conditions most favorable to corrosion. The invention aims to provide a high-pressure cylinder in which the head-end portion is relatively thick and a low-pressure cylinder-portion having a relatively thin wall formed of a heat treated metal capable of resisting the corrosive action just described. The low-pressure cylinder-portion, which is the part exposed to the most active corrosion, is made in the simplest possible form, for example, as a solid of revolution, symmetrical, or with equal thickness of wall. It is preferably formed of a corrosion resisting steel alloy, for example, stainless steel, or a steel containing one or more of the following metals; nickel, chromium, vanadium, tungsten, aluminum, silicon, manganese, molybdenum, copper, cobalt, and titanium. The alloy is subjected to heat treatment necessary to improve its resistance to corrosion and to give it the desired physical structure.

In the accompanying drawings:

Fig. 1 is a cross-sectional view of a high-pressure cylinder embodying the invention;

Figs. 2, 3, 6 and 7 are sectional views of other forms of low-pressure cylinder-portions;

Fig. 4 is a sectional view along line 4—4 of Fig. 2, and

Fig. 5 is a sectional view along line 5—5 of Fig. 3.

The apparatus illustrated in Fig. 1 comprises a head-end cylinder-portion 1 formed of a relatively thick piece of metal, for example, steel, to withstand the excessive pressures when the piston 2 is in the position shown at the upper end of its compression stroke. The head-end portion 1 has suitably mounted therein a suction valve 3 and a pressure valve 4 which are connected to intake and exhaust conduits 5 and 6 respectively. The low-pressure cylinder-portion 10 is so connected to the head-end portion 1 as to form a continuous cylinder for the reciprocation therein of the piston 2. The cylinder portion 10 has relatively thin walls in comparison with the relatively thick walls of the head-end portion 1 and is formed of a heat treated corrosion resisting alloy, such as stainless steel or the like.

The low-pressure cylinder is attached to or mounted upon a frame 11 and has a stuffing box 12 attached to the lower outside portion of the cylinder 10. The stuffing box comprises a packing 13 and a bushing 14 made, for example, of bronze, which butts up against the cylinder and serves as a guide for the piston rod 2. The stuffing box has a cover 15 for compressing the packing 13 by means of the bolts 16.

As shown in the drawings, the piston 2 is in the upper dead-end piston leaving a clearance 17 in which the fluids are compressed. When the piston moves on the downward stroke, it reaches the lower dead-end piston shown in the dotted lines within the bushing 14.

The low-pressure cylinder portion shown in Figs. 2 and 3 has upper and lower flanges 20 and 21, respectively, which are square in cross-section and the lower flange is larger in diameter but of the same thickness as the upper flange. The central body portion 22 is preferably cylindrical.

The low-pressure cylinder-portion shown in Figs. 4 and 5 comprises upper and lower flanges

25 and 26, respectively, which are of approximately the same thickness but the lower flange is of larger diameter. The central portion 27 is cylindrical as are the flanges, this cylinder being formed as a solid of revolution.

The low-pressure cylinder-portion shown in Fig. 6 comprises upper and lower flanges 30 and 31, respectively, in the central portion 32. This cylinder is made symmetrical with respect to the plane 33.

The low-pressure cylinder-portion shown in Fig. 7 comprises upper and lower flanges 35 and 36, respectively, and a central portion 37. This cylinder is made as a symmetrical solid of revolution with equal thickness of wall.

In view of the different kinds of metals used in forming the cylinder and stuffing box, there is a tendency for electrolysis to be set up with resulting decomposition of one or more of the metals. In forming the low temperature cylinder portion of the heat treated corrosion resisting metal, the destructive action resulting from electrolysis is very effectively suppressed.

I claim:

1. A high-pressure cylinder which comprises a head-end portion wherein a fluid medium undergoing compression is subjected to the highest pressure attainable in the cylinder, valves for the intake and exhaust of gas mounted in the head-end portion, a low-pressure portion having relatively thin walls with respect to the thickness of the walls of the head-end portion and a flange at each end, said low-pressure portion being formed of heat treated alloy steel which is highly resistant to the corrosive action in the cylinder and being connected by means of the flange at one end to the head-end portion and by means of the flange at the other end to a stuffing box, a piston reciprocable in the high-pressure cylinder, and means operatively connected to the stuffing box to guide the piston.

2. A high-pressure cylinder according to claim 1 in which the central portion of the low-pressure portion of the cylinder is about the same thickness as the flanges.

3. A high-pressure cylinder according to claim 1 in which the low-pressure portion is symmetrical with walls of uniform thickness.

OTTO MINDER.