

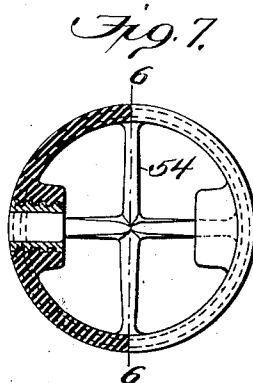
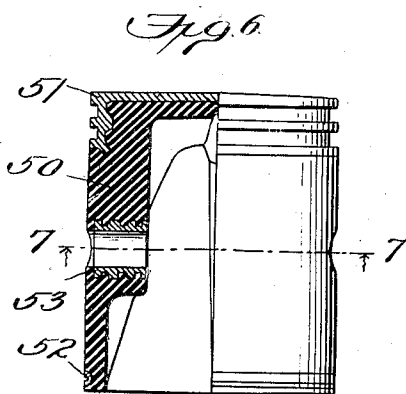
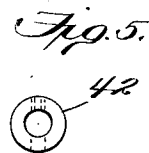
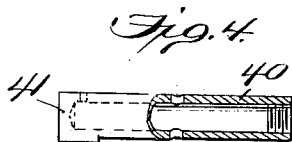
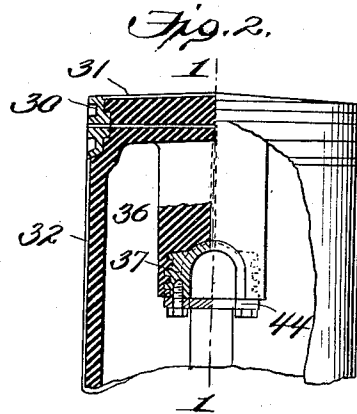
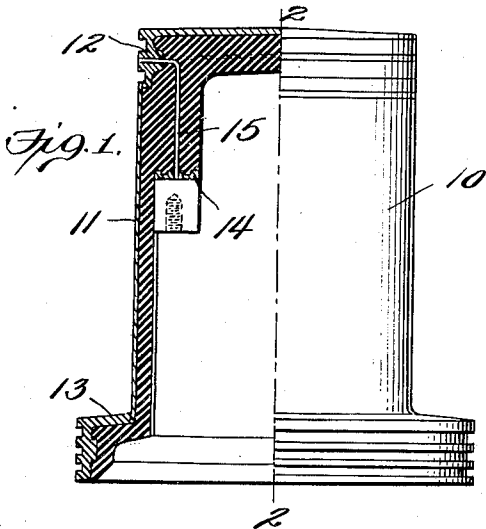
C. DE LUKACSEVICS AND E. LOFFLER.
PISTON.

APPLICATION FILED NOV. 8, 1920.

1,398,178.

Patented Nov. 22, 1921.

2 SHEETS—SHEET 1.



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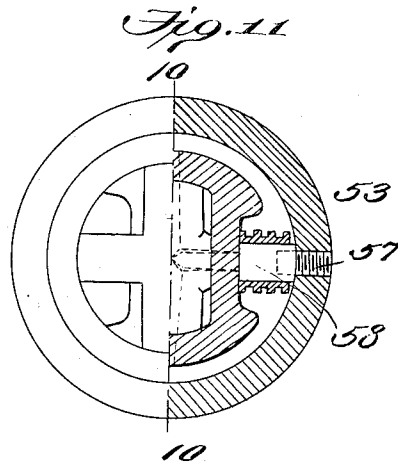
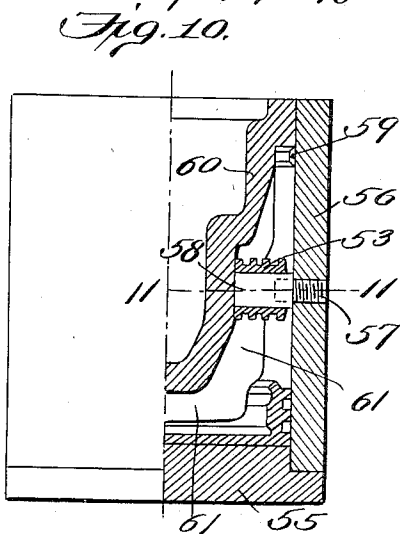
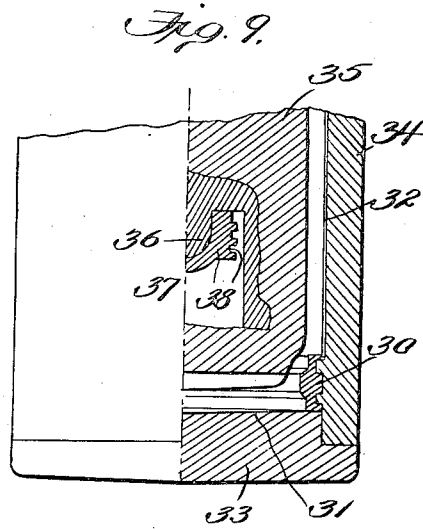
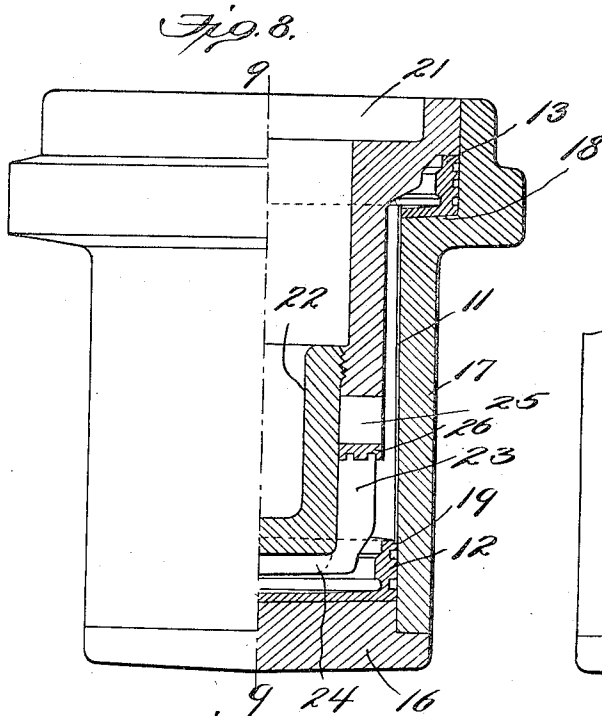
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CHARLES DE LUKACSEVICS AND EDMUND LOFFLER, OF NEW YORK, N. Y.

PISTON.

1,398,178.

Specification of Letters Patent.

Patented Nov. 22, 1921.

Application filed November 8, 1920. Serial No. 422,707.

To all whom it may concern:

Be it known that we, CHARLES DE LUKACSEVICS and EDMUND LOFFLER, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Pistons, of which the following is a specification.

Our invention relates to novel and improved piston construction which utilizes condensation products, such as bakelite, redmanol, condensite and the like for the body portion of the piston.

With metal pistons such as cast iron and aluminum difficulty has been experienced because of the internal stresses set up in the metal during the heating and cooling of the same in the casting operation. These frequently lead to distortion of the piston after it has been finally machined. It has been found, however, that pistons formed of one of the above mentioned materials cast to cylindrical shape will follow the conditions internally existing in the cylinders without cracking. Furthermore, metal inserts are used in connection with the body of the piston for holding the piston rings and piston pins, the former being preferably of the same material as the cylinders of the engine so as to harmonize with the cylinder in its expansion and contraction due to the heat within the cylinder.

It has also been found advantageous to use mica in conjunction with the walls of some pistons, for the purpose of utilizing the lubricating properties of mica and its heat insulating qualities in the reciprocation of the pistons.

In the following specification reference is made to the accompanying drawings, in which:—

Figure 1 is a partial side elevation and sectional view of a stepped piston, the section being taken on the line 1—1 of Fig. 2.

Fig. 2 is a part elevation and part sectional view on the line 2—2 of Fig. 1, but showing a slightly modified construction.

Figs. 3, 4 and 5 are details of a wrist pin used in connection with the form of piston illustrated in Fig. 1.

Fig. 6 is a part elevation and part sec-

tional view of the ordinary type of cylindrical piston, the section being taken on the line 6—6 of Fig. 7.

Fig. 7 is a partial plan view and partial section on the line 7—7 of Fig. 6.

Fig. 8 is a part elevation and sectional view of the die for making the piston illustrated in Fig. 1.

Fig. 9 is a partial elevation and partial sectional view on the line 9—9 of Fig. 8.

Fig. 10 is a partial elevation and partial sectional view of the die for forming pistons similar to that illustrated in Fig. 6, the section being taken on the line 10—10 of Fig. 11.

Fig. 11 is a part plan view and part sectional view of the die shown in Fig. 10, the section being taken on the line 11—11 of Fig. 10.

The stepped piston shown in Fig. 1 is adapted to reciprocate in concentric cylinders of different diameters arranged one above the other. The piston is composed of a bakelite body 10, having mica inserts 11 about the side walls, piston head and ring inserts 12 and 13 on the small and large piston heads respectively and piston pin inserts 14. An oil duct 15 leads from the top of the wrist pin to the side wall of the piston through the piston ring insert 12 and is preferably bored after the casting operation has been completed. In making this type of piston the die shown in Figs. 8 and 9 is employed. This die consists of the base portion 16, and the removable body portion 17 which is enlarged at the top above the shoulder 18 in order to receive the piston head and ring insert 13 of the large piston head. The piston ring insert 12 of the small piston head rests on the bottom plate 16 within the cylindrical portion 17. Each of the piston ring inserts is provided with grooves about its interior cylindrical surface for the purpose of anchoring the inserts on the bakelite body. Mica sheet 11 is placed in contact with the interior wall of the cylindrical piston 17 and the portion of the mica extends slightly beyond the top of cast iron insert 13, and the bottom engages in groove 19 formed along the edge of the piston insert 12.

The compression or male member of the

die (Figs. 8 and 9) is made of a part 21 of large diameter for forming the large piston head and the body portion up to the wrist pin retainer, and a part 22 of smaller diameter for forming the smaller interior portion of the piston. The part 22 is slotted at 23, 24 in order to form ribs of bakelite on the finished piston. The compression member 22 carries a pin 25 over which the metal wrist pin retaining insert is placed, the diameter of the pin being slightly larger than the interior dimension of the insert so that the latter will yieldingly maintain itself on the pin. The contacting surface of the insert 26 is grooved and provided with adhesive substance such as glue so that it may be attached and anchored to the bakelite. It is evident that bakelite placed within the die will assume the desired shape when a compression force is applied to the male member and as the bakelite hardens the metal inserts 12, 13 and 26 and the mica side sheets will be firmly embedded within the bakelite body.

The die shown in Fig. 9 is employed in making the piston shown in Fig. 2 in which mica sheets are used on the piston head and side walls. The piston ring insert 30 is a ring formed on its upper edge with a recess for receiving the edge of the top mica insert 31, and on its lower edge with a recess for receiving the upper portion of the side mica insert 32. The die comprises the base 33, cylindrical side walls 34 and the compression or male member 35 having a rounded boss 36 for frictionally holding the wrist pin retaining insert 37 which is grooved at 38 in order to effectively engage the bakelite. The top mica sheet 31 is first placed within the die and contacts with the base 33. The piston ring insert 30 is placed in position and then the mica side walls 32 are placed against the cylindrical side walls of the die and located in the appropriate recess of the piston ring insert. Bakelite in plastic condition is placed within the die and the compression member 35 is forced downward while the die is heated and subsequently chilled, when the pressure may be relieved, the compression member 35 withdrawn and the piston removed.

Figs. 3, 4 and 5 illustrate the type of piston pin 40 employed with the piston illustrated in Figs. 1 and 2. It will be noted that the same is bored for the transmission of lubricant and the one end is closed by the integral head 41 and the other end by the detachable head 42. Each head is provided with a flattened portion 43 for engaging straps 44 which retain the piston pin against rotation.

Figs. 6 and 7 illustrate the common type of cylindrical piston which according to our

invention is made of a top portion 50 of bakelite having a cast iron head and piston ring insert 51, the lower piston ring insert 52 and wrist pin insert 53. The piston is formed interiorly with the reinforcing ribs 54 which intersect beneath the piston head, extend the full width and thickness of the piston pin inserts and gradually taper to the lower end of the piston.

The die for making the piston 50 is illustrated in Figs. 10 and 11 in which 55 is the base member having an annular recess for receiving the cylindrical side walls 56. The latter are provided at opposite sides with threaded apertures for receiving the threaded extension 57 of a retaining pin 58 for the cylindrical wrist pin insert 53. The lower piston ring retainer 52 is maintained in place within the die by a slight annular rib 59 adapted to engage in the groove of the retainer. With the upper piston ring and head 51 in place in the die as shown in Fig. 10, the wrist pin retainer 53 and lower piston ring also positioned as illustrated in the figure, the plastic material such as bakelite may be placed in the die and the compression member 60 moved forward to force the material into the open spaces in the die. These open spaces include the longitudinal and transverse recesses 61 and 62 in the compression member which form the reinforcing ribs 54. After the material has hardened the compression member 60 and retainer 58 are removed, and base 55 displaced, when the cast piston may be readily forced over the rib 59 and out of the bottom of the die.

Bakelite and like substances used in piston construction yield under the construction and expansion of the metal inserts without cracking, and thus harmonize with the conditions existing within the cylinder. Pistons may be economically manufactured in accordance with our invention since the cost of the machining and grinding operations necessary with metal pistons is eliminated; and, furthermore, a piston giving an efficiency in operation is obtained.

Having described our invention what we claim as new and desire to secure by Letters Patent, is:—

1. A piston composed of a phenol condensation product and metal inserts and sheet mica embedded therein.

2. A piston composed of a phenol condensation product, metallic inserts embedded therein for receiving piston rings, and sheet mica embedded in said material for forming an exterior coating for the same.

3. A piston composed of a phenol condensation product, metal inserts embedded therein for receiving piston rings, and other metal inserts embedded therein for receiving the wrist pin.

4. A piston composed of a phenol condensation material, metal inserts embedded therein for receiving piston rings, other metal inserts embedded therein for receiving the wrist pin and an oil duct leading through said inserts and said material to the exterior of the piston.

5 In testimony whereof we have hereunto

set our hands in presence of two subscribing witnesses.

CHARLES DE LUKACSEVICS.
EDMUND LOFFLER.

Witnesses:

HARRIET ROBINSON,
RAE ROBINSON.