Nov. 1, 1932. N. J. BUREN 1,885,681

PISTON CONSTRUCTION

Filed Feb. 13, 1930 2 Sheets-Sheet 1

Fig. 1.

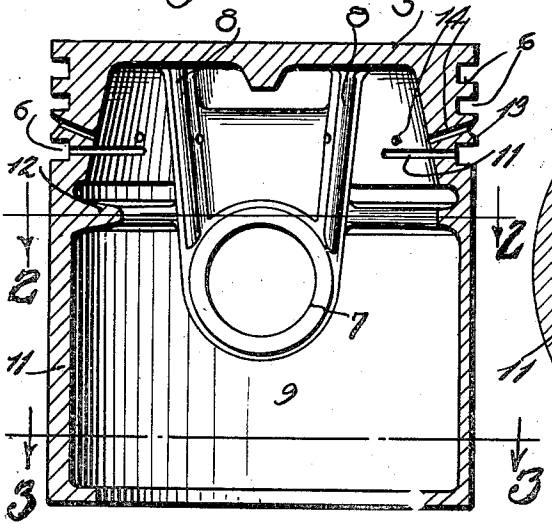


Fig. 3.

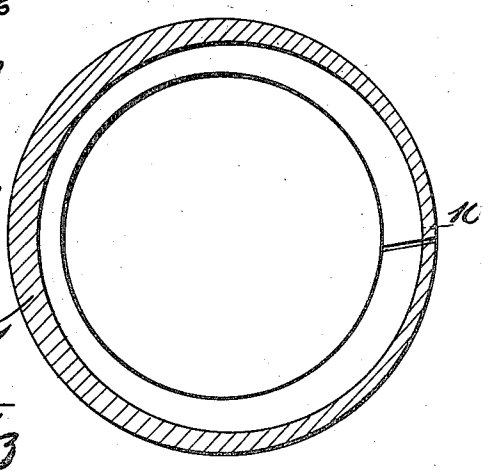


Fig. 2.

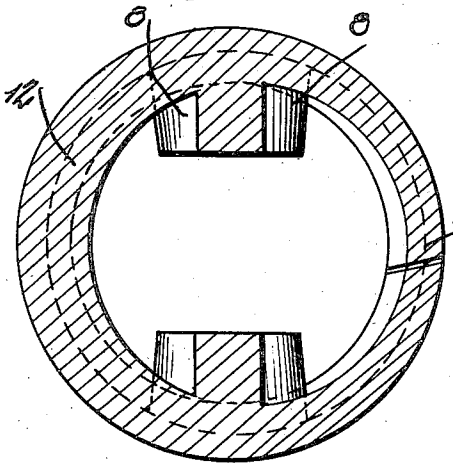
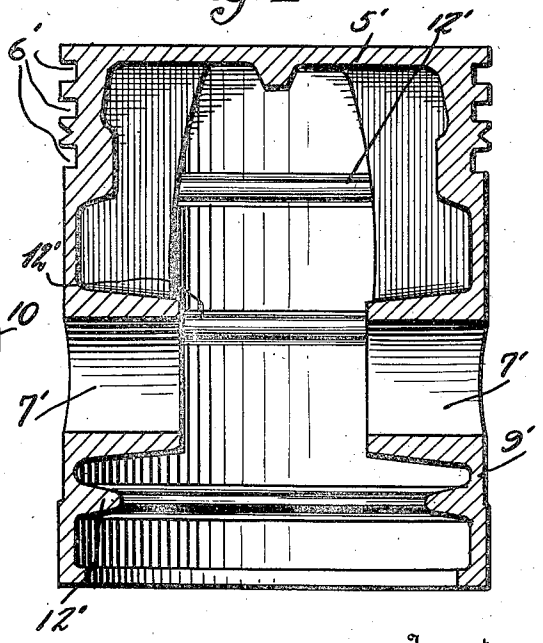


Fig. 4.



Inventor

Newton J. Buren.

By F. O. Bryant

Attorney.

Nov. 1, 1932. N. J. BUREN 1,885,681

PISTON CONSTRUCTION

Filed Feb. 13, 1930 2 Sheets-Sheet 2

Fig. 5.

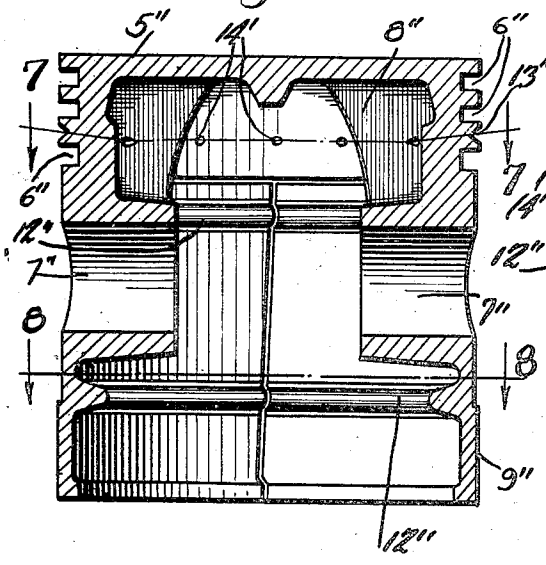


Fig. 6.

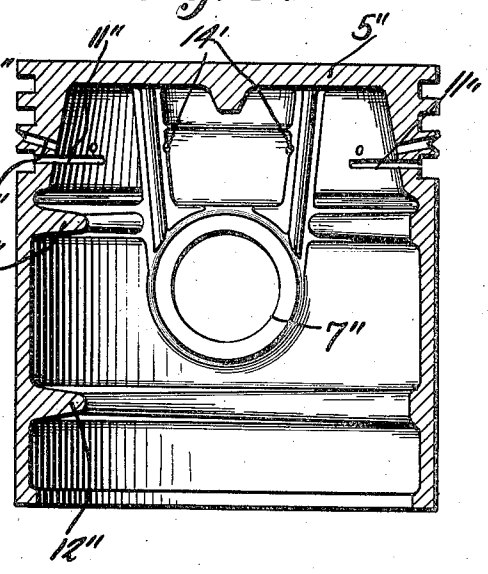


Fig. 7.

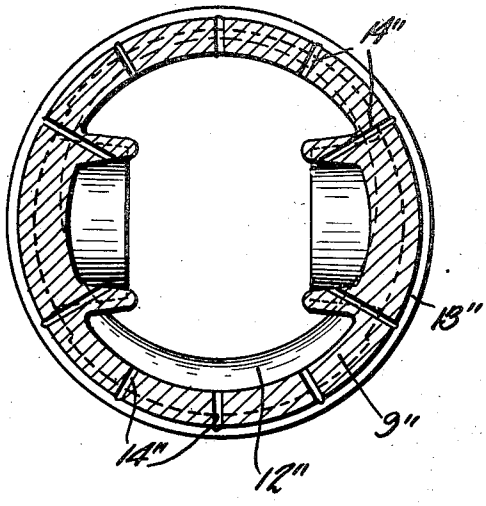
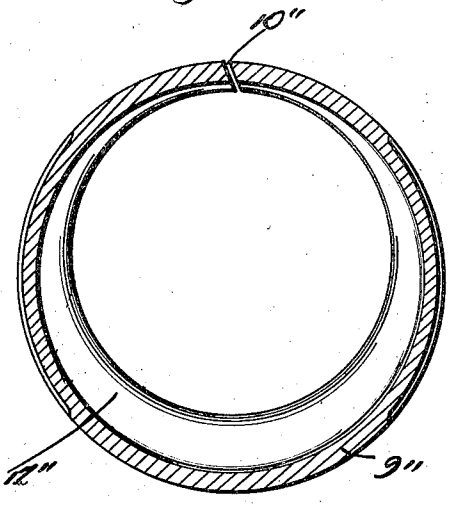


Fig. 8.



Inventor
Newton J. Buren.

By F. O. Bryant
Attorney.

Patented Nov. 1, 1932

1,885,681

UNITED STATES PATENT OFFICE

NEWTON J. BUREN, OF TACOMA, WASHINGTON

PISTON CONSTRUCTION

Application filed February 13, 1930. Serial No. 428,182.

This invention relates to improvements in piston construction of the type generally employed in the working cylinders of internal combustion engines.

Heretofore, it has been common practice to provide pistons having one side of the piston skirt slotted in order to provide means for taking up excessive skirt expansion. Such practice is objectionable because no special means has ever been provided to neutralize the flexibility caused by the slotting of the skirt. The disadvantages of a flexible piston skirt is known throughout the automotive industry. Flexibility of the skirt causes the piston to chatter or vibrate from connecting rod forces because it is not stiff enough to resist them. This results in noisy action, loss of power through wearing the faces of the piston rings slightly rounded, resulting further in oil pumping. A flexible piston hinges opposite the slot where there is no means provided to stiffen that portion of the skirt.

Definite means for overcoming the disadvantages above set forth is found by providing eccentric ribbing of eccentric contour in the cross section to offset the flexibility of the usual split skirt piston. The eccentric ribbing replaces a large amount of the rigidity lost when splitting the piston skirt. The thickest portion of the eccentric ribbing is placed opposite the slots and is embodied at present in two ways:

First—An eccentric skirt with one eccentric upper rib and a concentric bottom rib for machining;

Second—A concentric skirt with two or three eccentric ribs, depending upon the length of the piston.

Each type, of course, has the bottom of the skirt concentric for machining. The eccentric ribbing provides enough rigidity when the piston skirt is slotted to travel straight up and down without chatter or vibration. It is designed to function quietly when the pistons have gained their running clearances; that is, when expansion pressures have ceased to decrease the original skirt diameter.

The primary object of this invention, is to provide a piston of the split skirt type which will overcome the above disadvantages and which will comprise no more than the usual number of parts commonly used in present day piston construction.

Other objects and advantages of the invention, will become apparent during the course of the following description, forming a part of this specification and in which,

Figure 1 is a vertical sectional view of the preferred form of piston construction employing the single eccentric reinforcing rib formed integral with the inner wall of the piston;

Figure 2 is a transverse sectional view taken on line 2—2 of Figure 1 showing the eccentric formation of the piston skirt wall and also the enlarged cross-section area of the rib;

Figure 3 is a cross-sectional view taken transversely through the lower portion of the piston illustrated in Figure 1 and shows the enlarged portion of the eccentric piston skirt being opposite of the slot therein;

Figure 4 is a vertical cross-sectional view of a modified form of this invention and shows the skirt portion of the piston formed concentric with three eccentric ribs formed integral with the piston skirt in order to more thoroughly reinforce the same;

Figure 5 is a vertical cross-sectional view of a further modified form of this invention and this view is taken on the longitudinal axis of the wrist pin bearings and illustrates the concentric skirt portion and two eccentric ribs;

Figure 6 is a vertical cross-sectional view of Figure 5 taken at right angles to the axis of the wrist pin bearings to illustrate the arrangement of the eccentric reinforcing ribs;

Figure 7 is a transverse sectional view taken on Figure 5 on the line 7—7 showing the manner in which the upper eccentric rib is formed relative to the wrist pin bearing; and

Figure 8 is a transverse sectional view of Figure 5 taken on line 8—8 showing the cross-sectional area of the lower reinforcing rib relative to the vertical slot.

For a more detailed description of the drawings, attention is directed thereto where-

in the numeral 5 will be generally referred to to designate a piston having the usual piston ring grooves 6 and wrist pin bearings 7. The wrist pin bearings 7 are braced to the piston 5 by enlarged ribs 8 which terminate at their upper ends at the top wall.

A skirt portion 9 is formed on the lower portion of the piston 5 and it will be noted that the skirt 9 is split as at 10 vertically which terminates in a horizontal slot 11 formed in the upper end of the piston 5. This slot is provided for compensating piston clearances and allowing expansion and contraction of the skirt. It is to be noted that the skirt portion 9 is formed eccentrically in Figure 1 and that the thickest portion of the eccentric skirt 11 is directly opposite the vertical slot 10 whereby the same will be braced and formed more rigid. The skirt portion 9 is formed concentrically in Figures 4 and 5. The difference in design is to compensate for the large wrist pin lock bolts used in some engines of small bore. The latter case using a piston as in Figure 1.

Formed integral with the inner wall of the skirt 9 is an eccentric rib 12 which is formed of the same material as the piston skirt and which is also formed correspondingly to the thickness of the piston skirt 9. As illustrated in Figure 2, the largest portion of the eccentric integral rib 12 is also opposite the slot 10 whereby the free ends of the skirt adjacent the slot 10 will be formed more rigid and prevent collapsing of the piston skirt.

A circular cut away portion 13 may be formed between the piston ring grooves 6 for collecting oil in the cylinder wall and draining it back to the crank case through the apertures 14 which are arranged in spaced relation as illustrated in Figure 1. The groove 13 is used in conjunction with the usual oil control piston ring placed in the bottom top ring groove. The groove 13 drains the excess oil which cannot be passed through slot 11.

Attention is directed to Figure 4 wherein is shown the piston 5 having the usual piston ring grooves 6 and the wrist pin bearings 7. As shown in Figure 4, three or more eccentric ribs 12 may be provided for further reinforcing the skirt portion of the piston 5. The skirt portion 9' is not formed eccentric but depends largely upon the eccentric ribs 12 for furnishing the necessary rigidity thereof.

In Figures 5 to 8 inclusive, is illustrated a piston 5'' of a modified construction having the usual piston ring grooves 6'' and the wrist pin bearing surfaces 7''. The wrist pin bearings 7'' are braced in the head of the piston 5'' by the struts 8'' in order to furnish and accomplish a more efficient piston construction. As illustrated in Figures 5 and 8 inclusive, the skirt portion 9'' is slotted as at 10'' vertically which terminates in a horizontal slit portion of the piston 5'' as at 11'' and the eccentric ribs 12'' are formed integral with the inner walls of the piston skirt 9'' and as illustrated in these figures, only two eccentric ribs 12'' are employed for furnishing the required rigidly to the piston skirt. An annular cut away portion 13'' is formed between the piston ring grooves for collecting oil which is drained back to the bearings of the wrist pins through ports 14'' which terminate in the inner walls of the piston head 5''.

The value of groove 13 is in allowing the compression ring in the groove immediately above it, to act as both compression ring and scraper ring. Heretofore, all oil control in pistons has been confined to the lowest groove as illustrated at 6, and modern engines have such a great volume of oil that additional preventive means must be provided to reduce the oil consumption. Natural compression losses blowing by the rings above groove 13, blow excess oil through the holes 14. This also frees the oil ring in the bottom groove and allows free operation, free of gas pressure.

It is to be understood, that one or more eccentric reinforcing ribs may be employed to acomplish the desired results in this type of piston construction and that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same, but no limitation is drawn upon the specific arrangement and spacing of the eccentric ribs relative to the piston skirt.

It is to be further understood that any form of wrist pin bearing arrangement may be provided without departing from the spirit of the invention or the scope of the sub-joined claims.

Having thus described my invention, what I claim is:—

1. A piston construction of the character described, comprising a piston head, annular piston packing ring grooves formed in the head, a piston skirt depending from the piston head having a vertical slot extending from the bottom of the skirt to approximately the top thereof and terminating in a horizontal slot, and eccentric rings formed integral with the inner wall of the piston skirt and concentrically disposed relative thereto wherein the largest areas of the eccentric rings are directly opposite the vertical slot of the skirt whereby the piston skirt will be made more rigid.

2. In a piston construction, comprising a piston head having a series of annular packing ring grooves, an oil return groove formed between two of the above mentioned piston packing ring grooves for communicating with the oil return groove with the interior of the piston head, a split skirt depending from the piston head, and means for reinforcing the piston skirt at a point opposite the split portion thereof, said means com-

prising one or more eccentric ribs formed integral with the inner wall of the piston skirt and the reduced end of the eccentric rib being in close relation to the split portion of the skirt and the enlarged portion of the eccentric rib at a point opposite the split portion of the skirt.

In testimony whereof I affix my signature.

NEWTON J. BUREN.