To all whom it may concern:

Be it known that I, GEORGE PHILIP ALLEN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Universal Piston-Rod Connections, of which the following is a specification.

This invention relates to internal combustion engines, and particularly to a new and improved piston and connecting rod for the same.

The prime object of my invention is the provision of a piston and its connecting rod wherein these two elements are joined by a universal connection for the purpose of eliminating undue wear on the piston, due to improper alignment of the members on the crank shaft, with a corresponding elimination of friction between these moving parts of the motor.

A further object of my invention is the provision of a connecting rod having an eccentric or offset varying connection with the main crank of the engine, for the purpose of eliminating undue shocks and strain on the main crank of the motor, due to the initial impulse of the explosion, delivered when these two are practically on dead center.

Another object of my invention is the provision of a divisible piston, whereby worn parts may be easily and quickly replaced; and by the use of different metal the piston may be manufactured at a minimum cost consistent with maximum wear and efficiency.

The merits of my invention will be more fully set forth in the following specification, reference being had to the accompanying drawings illustrating the preferred form of my device and in which:

Figure 1 is a sectional elevation taken as indicated by the line 1—1 of Fig. 3.

Fig. 2 is a similar view taken as indicated by the line 2—2 of Fig. 1.

Fig. 3 is a sectional plan view taken as indicated by the line 3—3 of Fig. 1.

Fig. 4 is an elevation of my improved connecting rod showing the eccentric or off-center lower bearing.

My invention comprises essentially a piston 10 and a connecting rod 11, operatively connected together by means of a universal connection generally designated by the numeral 12. The piston 10 consists of a top portion or head 13 and a lower portion or skirt 14. The head 13 may be constructed of any suitable material such as aluminum, and the skirt 14 of cast iron. The head 13 is provided with annular recesses 15 for the reception of suitable piston rings 16. The head 13 may be considerably shorter, in the direction of depth than the skirt 14, and has its lower peripheral edge rabbed as at 17 and externally screw threaded as at 18, for the reception of the skirt 14 which is internally screw threaded around its top edge as at 19. The skirt 14 may be provided with spaced apertures 20, through its walls and adjacent its bottom for the insertion of a wrench or suitable tool for effecting its attachment and removal from the head 13.

A pair of co-axial bearings 21, consisting of bases 22 formed integral with the piston head 13 and removable caps 23, each having laterally extending ears 24 and 25, respectively, through which cap screws 26 for securing these parts together. The base portions 22 are supported on the under side of the head 13 by means of side webs 25 and a central web 26, cast integral with the head.

A cruciform bearing block 27 has co-axial arms 28 and 29, extending at right angles to each other. The arms 28 are rotatably supported in the bearings 21, and act as a wrist pin for the connecting rod 11. The bearing block 27 may be either solid, or for the purpose of lightness and economy of construction, may be hollow or tubular, as shown in Figs. 1 and 2.

The connecting rod 11 consists of a shank 30 terminating at its upper end in a bifurcated portion 31, and having a split bearing 32 on its opposite end. The bifurcated end 31 consists of a pair of co-axial bearings 33, consisting of base portions 34, formed integral with the end 31, and complementary removal caps 35. The portions 34 and 35 have laterally extending ears 34a 100 and 35a 101 for the reception of cap screws 36.

The arms 29, of the block 27, are adapted to be journeled in the bearings 33, to act as a wrist pin for the connecting rod 11. The bearing 32 on the opposite end of the rod 11 consists of a base portion 37, formed integral with the rod, and a removable cap 38, the two being secured together by bolts 39 passing through laterally extending ears 37a and 38a, respectively. The shank 30 of 110
the connecting rod 11 is offset with reference to the center of the base 37, as clearly shown in Fig. 4, for the purpose of lessening the shock and strain on the main crank shaft bearings delivered through the connecting rod 11 by the explosion in the cylinder when the piston has reached the limit of its upstroke; and when the crank and connecting rod are practically on dead center.

In the operation of my device, from the foregoing description, it is obvious that the connecting rod, connected at its upper end, to the arms 29 of the block 27, the said arms 29 acting as a wrist pin, will function in the usual way; while the transversely extending arms 28 mounted in the bearings 21, of the head 13, will compensate for the slight irregularity in alignment of the connecting rod; thus eliminating side-slap or excessive friction, between the piston and the cylinder walls, and consequently eliminate excessive wear on these parts. Other uses and advantages are obvious.

Having described my invention I claim:

1. The combination with a piston head 25 having sets of internally arranged integrally formed depending convergent webs and co-axially spaced bearings formed on the ends of respective sets of said webs, of a cruciform bearing block having a pair of its arms 30 journaled in said bearings and a connecting rod having a bifurcated end that engages the other pair of arms of said bearing block.

2. A piston structure consisting of a head end with a skirt receiving rim, a pair of co-axial semi-cylindrical bearings, and a set of bracing webs for each bearing, the webs of each set arranged in radial positions to the axis of the bearing to obtain necessary strength and lightness of structure; the axis of the bearing being below the said rim of the head.

In testimony whereof I have signed my name to this specification.

GEORGE P. ALLEN.