H. WIESNER.

SHEET METAL PISTON FOR RECIPROCATING ENGINES.

APPLICATION FILED AUG. 3, 1910.

984,250. Patented Feb. 14, 1911.

FIG. 1.

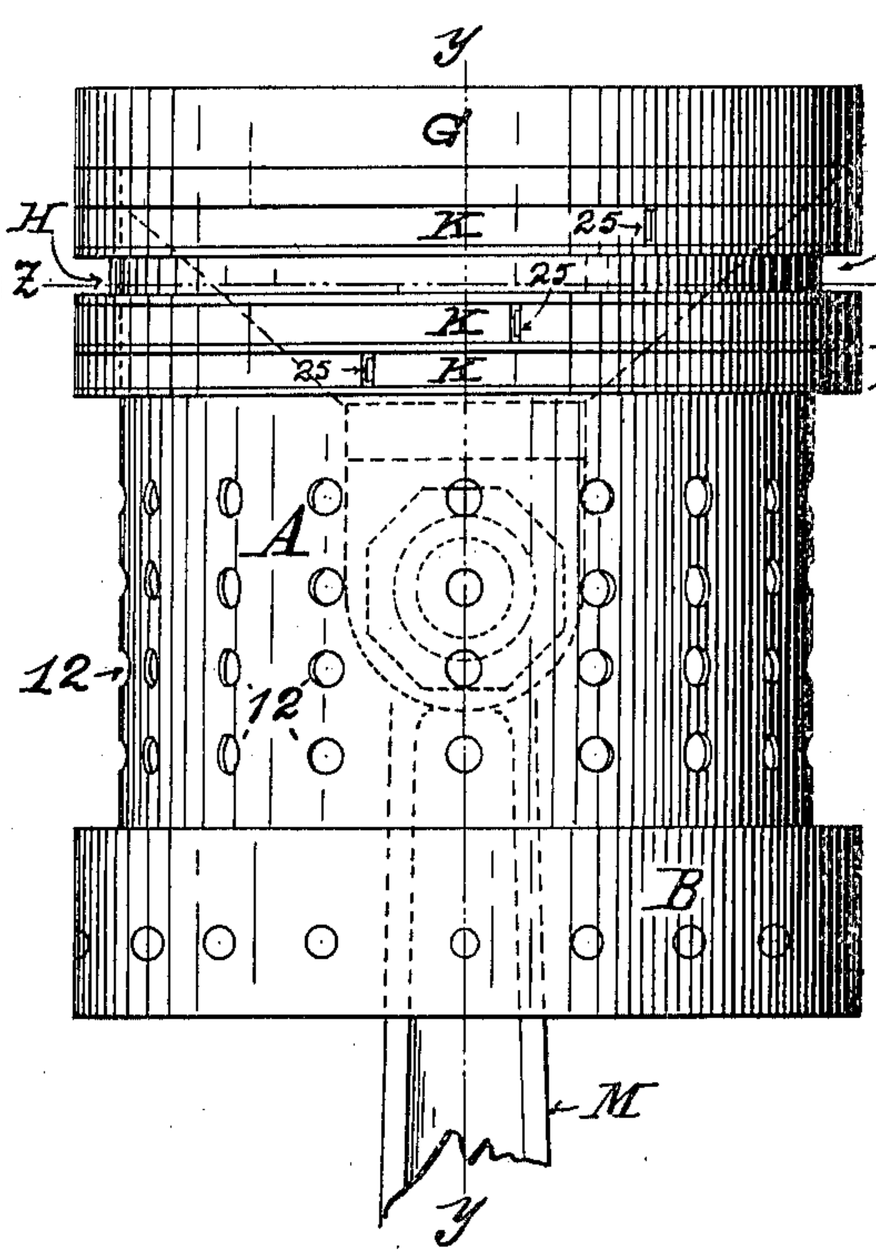

FIG. 2.

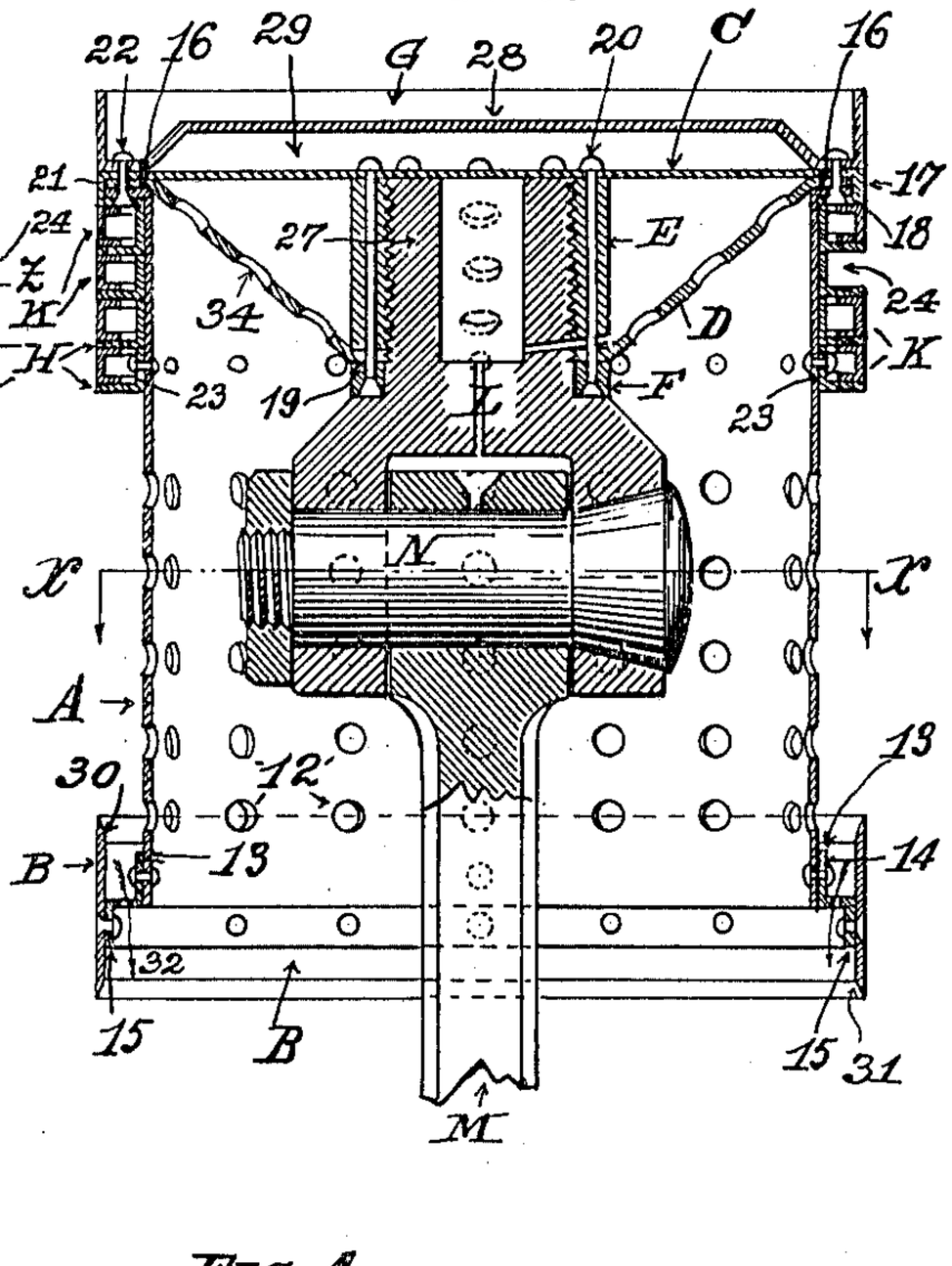

FIG. 3.

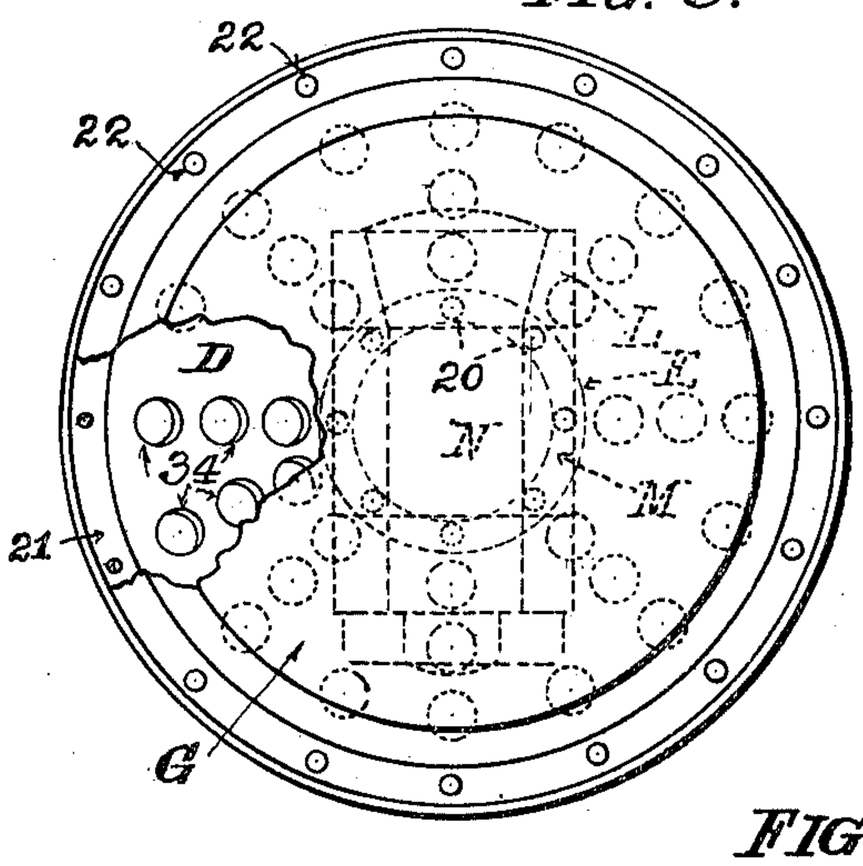

FIG. 4.

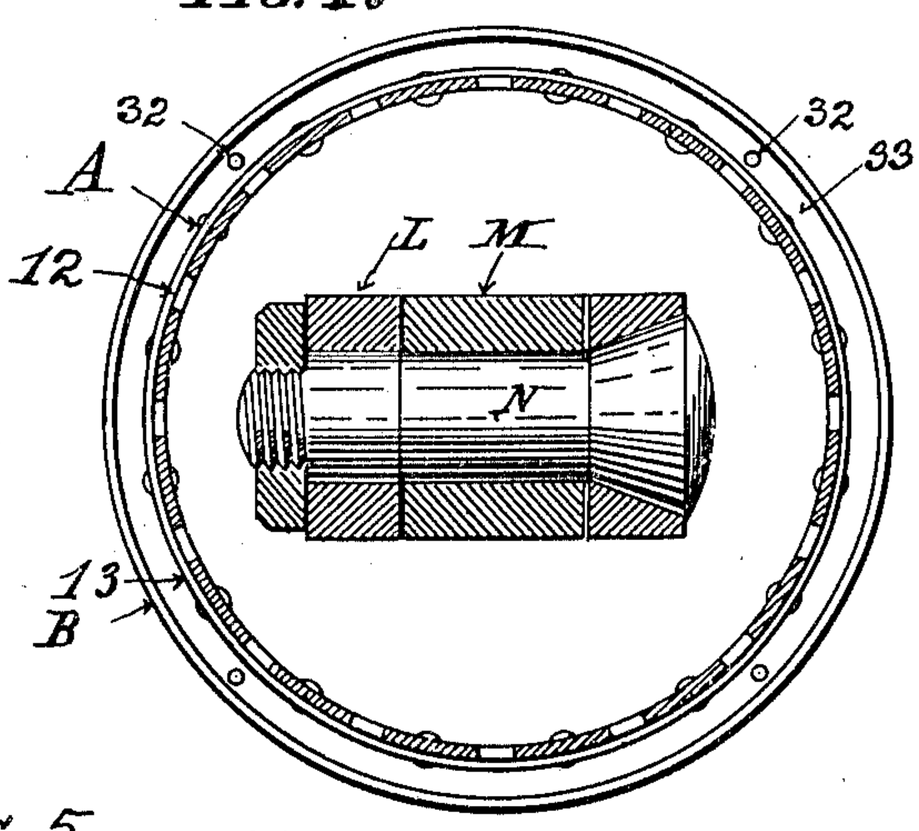

FIG. 5.

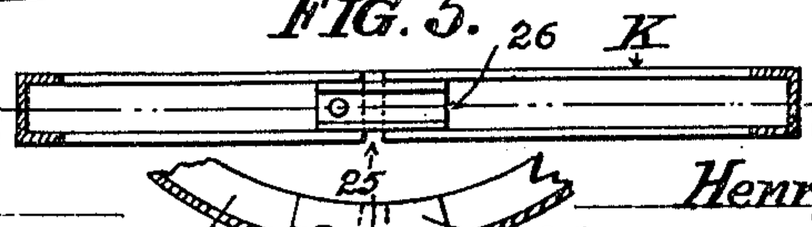

FIG. 6.

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SHEET-METAL PISTON FOR RECIPROCATING ENGINES.

984,250. Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed August 3, 1910. Serial No. 575,214.

To all whom it may concern:

Be it known that I, HENRY WIESNER, a subject of the Emperor of Austria-Hungary, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Metal Pistons for Reciprocating Engines; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has general reference to pistons for reciprocating engines, and its object is the production of an engine piston that shall be extremely light in weight but very strong, durable, and effective in operation.

It consists, essentially, in the novel and peculiar combination of parts and details of construction as hereinafter first fully set forth and described and then pointed out in the claims.

In the drawings already mentioned, which serve to illustrate this invention more fully, Figure 1 is an elevation of my improved engine piston, one of the piston rings being removed. Fig. 2 is a longitudinal sectional elevation of the same, on line *y y* of Fig. 1. Fig. 3 is a plan, a portion of the pistor. extension and the piston head being broken away to disclose underlying parts. Fig. 4 is a sectional plan on line *x x* of Fig. 2. Fig. 5 is a sectional view of one of the piston rings detached, the view being taken on line *z z* of Fig. 1. Fig. 6 is a sectional view of a fragment of said piston ring, taken on line *w w* of Fig. 5.

Like parts are designated by corresponding symbols and characters of reference in all the various figures.

This engine piston is, as far as possible, constructed of sheet iron or sheet steel properly hardened, whereby an exceedingly light durable and efficient piston is produced which is especially serviceable in internal combustion engines used for aviation purposes.

A in the drawings designates the main portion or body of this engine piston, which may be produced from tubing, and when the piston is to be of such size that tubing is not available or practical, may be produced from sheet metal, formed into a cylinder and having its seam either butt riveted or welded, which latter method of jointing the seam is, at the present advanced state of the art of electrically welding entirely practical and can be very cheaply performed. In this shell A, I prefer to punch a number of holes 12, to lighten the structure as much as possible without deteriorating its strength. To the lower end of this shell there is riveted or otherwise secured a collar 13, which collar may be formed of two angles, or in approximately the shape of the letter Z, in cross section, the vertical member 14 of which is secured to the shell A, while to the other vertical member 15, there is fastened a band B, the external diameter of which corresponds to the bore of the engine cylinder in connection with which the piston is to be used.

The upper end of the shell A is outwardly flanged at 16, the object of which will farther on appear. Above this outwardly projecting flange 16 there is located a piston head C, also formed from sheet metal. This piston head has a downwardly projecting rim 17, the edge of which is inwardly turned at 18, to underlie the outwardly turned flange 16 of the shell A.

Immediately below the piston head C there is located a cone-shaped reinforcing member D, being an inverted truncated cone, the lower end of which is inwardly turned at 19, to afford a flange which engages the lower end of a cylindrical sleeve E, located centrally below the lower surface of the cylinder head C and the upper surface of the flange 19, there being below the inwardly turned flange 19 a collar F, rivets 20, being passed through the cylinder head C, the sleeve E, flange 19, and the collar F, to securely and permanently unite these parts in an efficient manner.

The upper edge of the cone D is outwardly turned at 21, to underlie the piston head C, and above this piston head C there is placed an extension G thereof, the outer vertical wall of which, as well as the outer wall of the downwardly turned rim 17 of the piston head C being of a diameter corresponding to the bore of the engine cylinder (not shown), the same as the band B, to guide the piston in said cylinder.

Upon the outer surface of the shell A, and preferably immediately below the inturned flange 18 of the piston head C, there are located a series of bands H, L-shaped in cross

section, the vertical member 23, of the lowermost band H being riveted to the shell A, while the superimposed bands H may simply fit the outer surface of the shell A a tight fit.

The spaces 24 between the lateral members of the bands H afford grooves wherein are located the piston rings K. These piston rings K are formed from sheet metal in the shape of a channel, and they are split at 25, Figs. 1, 5, and 6, and in the groove of these rings there is provided a lapping piece or member 26, of substantially U-shape in cross section, said lapping member being fastened to one end of the ring, near the split 25, and crosses the split to permit the rings to expand without leakage past the ring.

The sleeve E heretofore mentioned is internally bored and screw threaded to receive the externally screw threaded shank 27 of the knuckle or fork L, wherein one end of a connecting rod M, is pivoted by the usual wrist pin N.

The extension G of the piston head C has its bottom dished or upwardly raised at 28, Fig. 2, to afford an air space 29, between the bottom of the extension and the piston head which serves as a non-conductor of heat, and may be further augmented by filling this space with a good non-conductor of heat, such as asbestos fiber, mineral wool, etc.

The inner upper, and lower edges of the bottom band B are beveled to a sharp edge at 30, 31, respectively. This causes the lubricant used in the cylinder and adhering to the inner wall of the bore thereof to be scraped off by the upper sharp edge and to run down the inner surface of the band, and through apertures 32, in the horizontal member 33 of the band or collar 13 downwardly back to the cylinder wall thereby keeping up a continuous circulation of the lubricant above and below the piston.

The reinforcing cone D is, preferably, punctured with a number of holes 34, to reduce its weight without materially impairing its stiffness. This cone, as well as the extension of the piston head, the piston head, the bands H, the collar 13, and the piston rings may be readily produced from sheet metal in the process of stamping in suitably constructed draw dies and punching dies, so that these parts can be made at a very reasonable cost.

It will now be observed that a piston made from sheet metal as described, is extremely light. This is a very desirable feature, especially in rapidly moving internal combustion motors adapted for aviation purposes where the reduction of weight of the motor to its lowest possible limit, is an absolute necessity. It also reduces the counterbalancing of the moving parts to a minimum.

To attain the best results with a sheet metal piston, it is desirable that the metal after having been variously shaped, be hardened either by the process of case-hardening or quenching when hot in a cooling medium, or other suitable hardening process of which several are well known and practiced.

I have heretofore stated that the shell A and the cone B are preferably perforated to lighten the same. These perforations may, however, be dispensed with if desired. I am also aware that changes in the details of construction of this piston may be made by persons skilled in the art to which this invention appertains, without departing from the scope of my invention, which broadly speaking resides in the production of a sheet metal piston, especially of the trunk-piston type, adapted for use in internal combustion engines, and particularly for aviation purposes, and for use in automobile engines.

Having thus fully described this invention, I claim as new and desire to secure to me by Letters Patent of the United States—

1. A piston for reciprocating engines, comprising a sheet metal shell smaller in diameter than the bore of said engine, a piston head on said shell and of an external diameter corresponding to said bore, a series of bands on the outside of said shell in spaced relation, rings in the spaces between said bands, and a band at the lower end of said shell of a diameter corresponding to the diameter of said bore, there being means in said piston for attachment of a connecting rod, as specified.

2. A sheet metal piston, comprising a shell smaller in diameter than the bore of an engine cylinder in which said piston is adapted to function, a piston head at one end of said shell said piston head having an external diameter corresponding to the bore of said engine cylinder, a cone shaped reinforcing member below said piston head and permanently secured thereto, a sleeve interposed between said piston head and the lower end of said reinforcing cone and permanently secured thereto, a fork in said shell, said fork being secured to said sleeve, a series of collars upon the outer surface of said shell and in spaced relation, and a piston ring in each of the spaces between said collars.

3. A sheet metal trunk piston for internal combustion engines, comprising a thin cylindrical shell, an outwardly projecting collar at one end of said shell, a band on the outside of said collar, the outer diameter of said band being substantially the same as the bore of said engine, said shell having its other end outwardly flanged, a cup-shaped piston head engaging said flange, the rim of said piston head being downwardly and inwardly turned the inwardly turned portion underlying the flange on said shell, a cup-

shaped extension on said piston head, a series of collars upon the outer surface of said shell said collars being each of substantially L-shape in cross section, the inner members of said collars being vertically disposed and adapted to separate the collars in spaced relation, piston rings in the spaces between the horizontal members of said collars, and means in said shell adapted to receive a connecting rod, said means being secured to said piston head and said reinforcing cone, as described.

4. In a reciprocating engine, a piston comprising a sheet metal body, there being on said body laterally projecting collars in spaced relation and affording parallel grooves, and a piston ring in each of said grooves, said piston rings being substantially U-shaped in cross section and of even thickness throughout, there being in each ring a gap, and in the channel of each ring a substantially U-shaped lapping member, said lapping member being attached at one end adjacent to said gap, the other end of said lapping member being free to move in the channel of the adjacent end of said ring.

5. A sheet metal piston comprising a sheet metal shell, a sheet metal piston head at one end of said shell, said piston head having an external diameter corresponding to the diameter of the bore of the engine in connection with which said piston is to be used, a sheet metal cone-shaped reinforcing member below said piston head and attached thereto, a series of sheet metal collars upon the outer surface of said shell and in spaced relation, one or more of said collars being attached to said shell, and a piston ring in each of the spaces between said collars.

6. A sheet metal piston, comprising a sheet metal shell, a sheet metal piston head at one end of said shell, said shell being smaller in diameter than the diameter of the bore of the engine in connection with which said piston is to be used, said piston head being of an external diameter corresponding to the diameter of said bore, a sheet metal, cone-shaped, reinforcing member below said piston head and attached thereto, a series of sheet metal collars on the outer surface of said shell and secured to said shell, said collars being in spaced relation, and a piston ring in each of the spaces between said collars, all of the above-named sheet metal parts being made from soft metal and hardened after having been formed.

In testimony that I claim the foregoing as my invention, I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY WIESNER.

Witnesses:
MICHAEL J. STARK,
M. F. SULLIVAN.