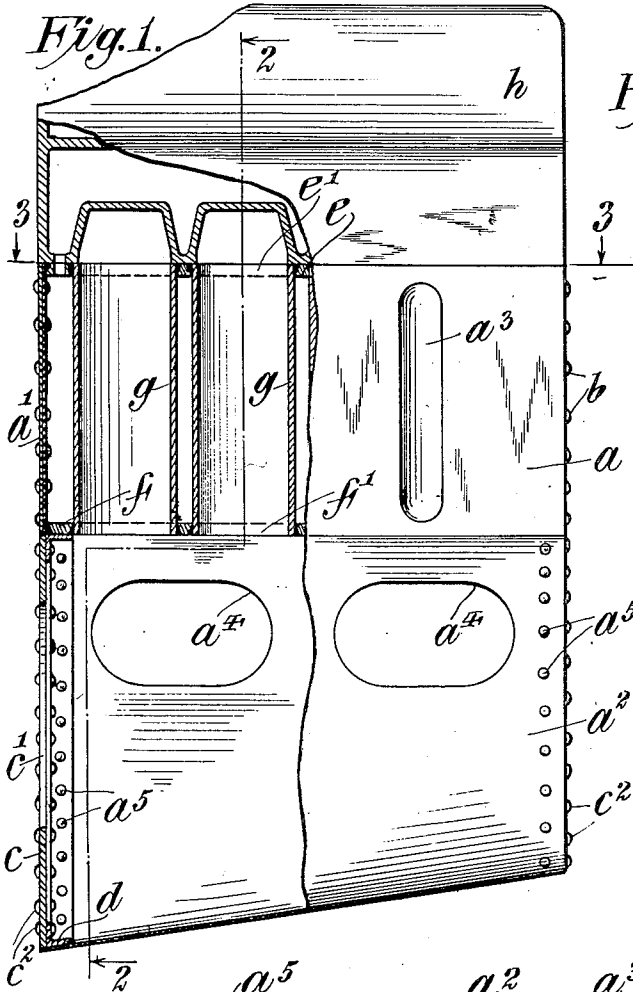
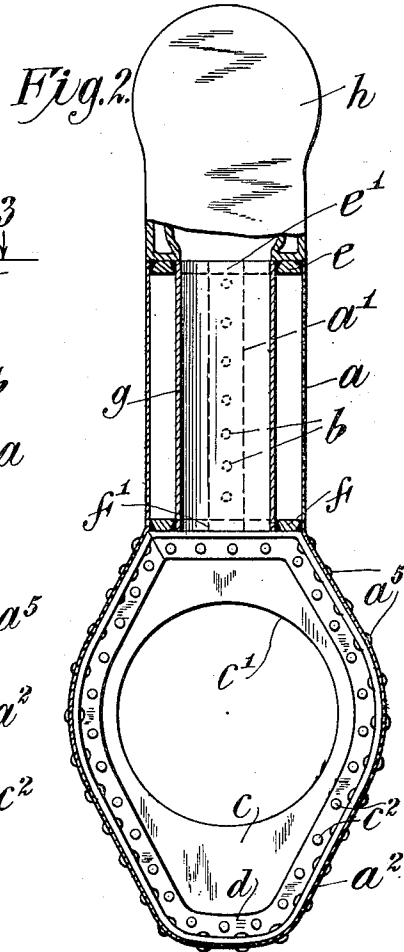
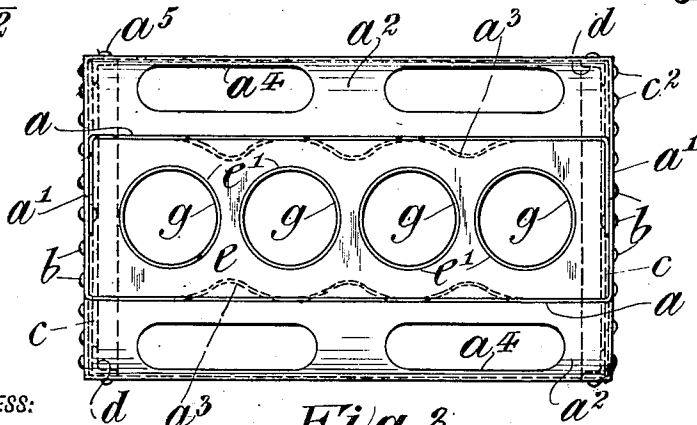


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SHEET METAL INTERNAL COMBUSTION ENGINE.
APPLICATION FILED JUNE 21, 1917.

1,287,359.

Patented Dec. 10, 1918.



WITNESS:
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SHEET-METAL INTERNAL-COMBUSTION ENGINE.

1,287,359.

Specification of Letters Patent.

Patented Dec. 10, 1918.

Application filed June 21, 1917. Serial No. 176,042.

To all whom it may concern:

Be it known that I, AUGUST H. LEIPERT, a citizen of the United States, residing in the borough of Brooklyn of the city of New York, in the State of New York, have invented certain new and useful Improvements in Sheet-Metal Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to internal combustion engines in which the engine walls and crank case are formed of sheet metal and it has for its principal object to provide an engine casing of this character in which the walls of the engine casing are formed integral with the side walls of the crank case and the whole is pressed from a single blank of metal. In forming an engine casing of this character not only must mechanical considerations concerned with the operation of the engine be taken into account, but the manufacturing problems connected with the handling of sheet metal in a way which will admit of the formation of the desired structure must be met. By the present invention it is believed that there is provided a structure in which great strength and rigidity are realized by forming the walls of the crank case integral with the walls of the cylinder section from a single integral blank by suitable stamping or pressing operations available in the sheet metal art. In accordance with the invention the outer side walls of the cylinder section and crank case are formed integral, while the end walls of the cylinder section are formed by united flaps stamped in the blank and bent at right angles to the side walls of the cylinder section. The end walls of the crank case, on the other hand, are formed of separate plates, placed in position and united with the side walls of the crank case and so shaped as to receive the end bearings for the crank shaft. The proposed construction will appear more clearly from the description of the accompanying drawings, in which—

Figure 1 is a somewhat conventional view, partly in side elevation and partly in section, of a sheet metal engine formed in accordance with the invention.

Fig. 2 is a view in transverse section, taken along the planes indicated by the

broken lines 2—2 of Fig. 1 and looking in the direction of the arrows.

Fig. 3 is a view in plan taken along the plane indicated by the line 3—3 of Fig. 1 and looking in the direction of the arrows, the engine head being removed.

While the parts of the engine casing hereinafter to be described must be interconnected, where necessary, as by welding or rivets or other available devices, it is to be understood that the character of the connections shown in the drawings are not to be taken as limiting the invention to such connections. Further, the invention is not to be limited to the shape, size or relative disposition of the parts thereof except in so far as these parts, considered as separate units, are required to be related in the precise manner to be pointed out hereinafter. The side walls a of the cylinder section of the engine casing and the end walls a' thereof are stamped from a single blank of sheet metal integral with the side walls a^2 of the crank case. The end walls a' , as indicated, may be formed as flaps or flanges extending beyond the side walls proper and bent in toward each other, respectively, at the opposite ends, and arranged to be united, as by means of rivets b or by welding, to form continuous end walls. The said walls of the cylinder section may also have pressed therein during the forming operation radiating corrugations a^3 to facilitate cooling in a manner known. The side walls of the crank case a^2 may also have stamped therein hand holes a^4 for affording ready access to the interior of the crank case. The shell formed in the manner thus described is completed by applying separate end plates c to form the end walls of the crank case a^2 , and these separate end walls may also be stamped from sheet metal and be formed with openings c' therein to receive bearings for the crank shaft. A convenient means of uniting these end plate c with the side walls a^2 of the crank case and of reinforcing the crank case is to attach angle irons d within the walls of the crank case adjacent the ends thereof and extending entirely around the crank case, as indicated in Fig. 2, and then securing the end plates c to these angle pieces as by means of rivets c' . The angle pieces themselves may be secured to the side

walls of the crank case by means of rivets a^5 or by welding, or otherwise, as may be best. The cylinder section has supported therein adjacent its top and bottom horizontal plates e, f which are preferably welded within the side walls, and are formed with openings e', f' , alined in the top and bottom plates, respectively, to receive the cylinders g which, in turn, are suitably united with said plates, as by welding.

The head h for the motor may be formed in any suitable way and is, in general, of usual type, and is applied to the sheet metal engine and secured thereto in any known manner.

The motor casing proper, as formed of sheet metal in the manner described and completed with the necessary end plates and top plates, is of simple, light and durable construction and may be shaped by simple pressing or stamping operations and from a single sheet of metal. The permanent set given to the walls may be of such accuracy with relation to the bearings and other moving parts of the motor that relatively little finishing or machining, if any, will be required. The support of the motor

on the chassis of an automobile, for instance, may be obtained as may seem desirable and may be as by means of flanges or the like struck up integral with some part of the sheet metal walls.

I claim as my invention:

1. A sheet metal casing for an internal combustion engine having the side walls of the cylinder section and the side walls of the crank case stamped from a single sheet of metal and pressed to form and having opposed flaps stamped from the same sheet and bent inward and permanently secured together to form the end walls of the cylinder section.

2. A sheet metal casing for an internal combustion engine having the side walls of the cylinder section and the side walls of the crank case stamped from an integral sheet of metal, angle pieces secured in the side walls of the crank case adjacent the ends of the case and separate end plates for the crank case secured to said angle pieces.

This specification signed this 20th day of June, A. D. 1917.

AUGUST H. LEIPERT.