

1,286,627.

Patented Dec. 3, 1918.

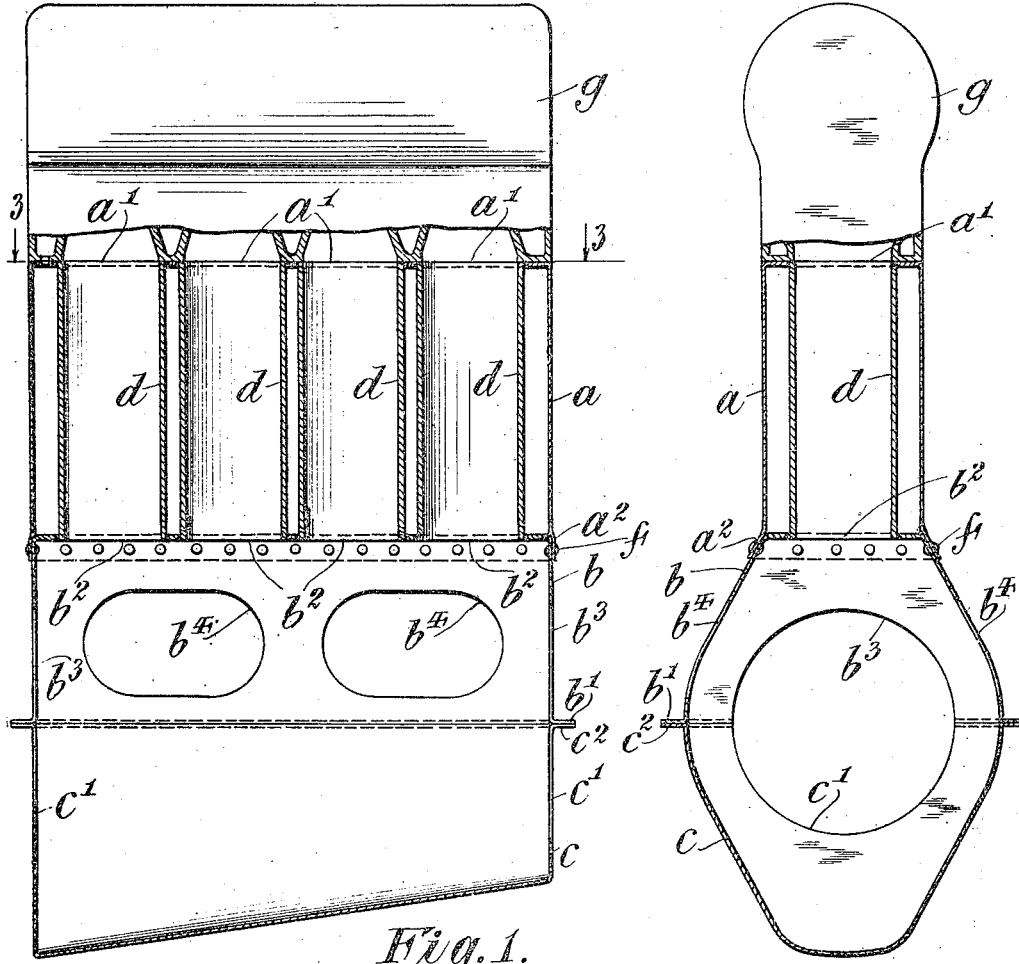


Fig. 1.

Fig. 2.

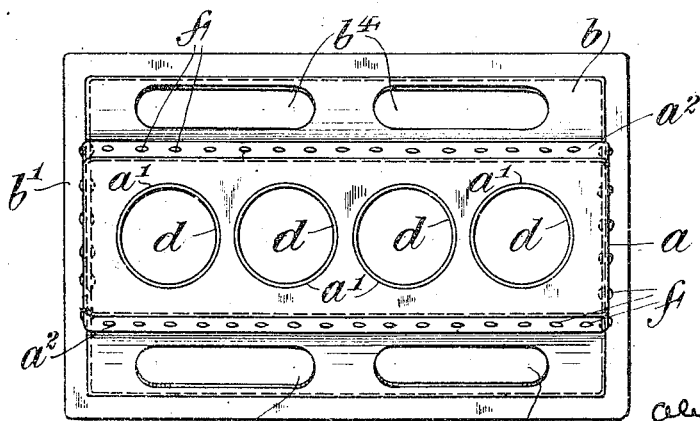


Fig. 3.

WITNESS:
 Geoschmartz

INVENTOR
 Alexander G. Herreshoff
 BY
 Redding G. G. & Co.
 ATTORNEYS

UNITED STATES PATENT OFFICE.

ALEXANDER GRISWOLD HERRESHOFF, OF NEW YORK, N. Y., ASSIGNOR TO INTERNATIONAL MOTOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

SHEET-METAL INTERNAL-COMBUSTION ENGINE.

1,286,627.

Specification of Letters Patent.

Patented Dec. 3, 1918.

Application filed June 21, 1917. Serial No. 176,037.

To all whom it may concern:

Be it known that I, ALEXANDER GRISWOLD HERRESHOFF, a citizen of the United States, residing in the borough of Manhattan 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 improvements in internal combustion engines in which the casing, including the walls of the cylinder section and the crank case of the engine, is formed wholly from sheet metal united in any approved manner to form a light strong motor. Sheet metal motors, while possessing the advantages of lightness and strength and overcoming the disadvantages in the use of cast material, present very difficult problems in their manufacture, so that the question as to how the blank is to be handled becomes one of prime importance and one far beyond the skill of the mechanic. The present invention has for its object to provide a sheet metal casing formed from blanks in such manner as will satisfy the practical requirements of manufacture and shall, when built up from sections, be of strong construction and thoroughly practicable as a casing for an internal combustion engine. In accordance with the invention, the improved casing is formed from drawn metal, in three sections, built up in such manner that the crank case shall consist of two sections united along diametrical lines in a horizontal plane and the walls of the cylinder section shall comprise the third section united with the upper section of the crank case along diametrical lines in the plane of the lower ends of the cylinders. Each one of the said sections shall be of integral construction drawn from a single sheet of metal and united with the contiguous sections either by welding or riveting or by any other available method. The invention will be described with greater detail in connection with the illustrated embodiment thereof shown in the drawings, in which—

Figure 1 is a view partly in vertical section and partly in side elevation of an engine casing constructed in accordance with the invention, the head also being shown.

Fig. 2 is a view in transverse section of the casing shown in Fig. 1.

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.

As indicated hereinbefore, an internal combustion engine casing of sheet metal presents very serious manufacturing difficulties in that the sheet metal must be so handled as to provide a casing in which the walls when once set, will remain in fixed relation to various other parts so that stresses of all kinds shall not be imparted to any of the elements. This consideration is of prime importance in connection with the crank shaft, the piston rods and the crank shaft bearings, since it is necessary that the pistons shall travel in parallelism and in fixed relation to the crank shaft. Other difficulties in the commercial development of a successful sheet metal internal combustion engine arise in connection with the assembling of the cylinders and the other parts, particularly the bearings for the crank case.

By the present invention it is sought to provide a casing which may be manufactured of integral sheet metal sections, which sections may be interconnected and fixed in permanent relation to each other and to the moving elements of the motor without great difficulty. Referring to the drawings, it will be seen that the motor is formed of three sections, the upper one of which *a* comprises the cylinder section or outer wall of the water jacket, while the two lower sections *b*, *c*, when united with one another and with the cylinder section, constitute the crank case. The upper section *a* is drawn from a single blank of sheet metal and is integral throughout, the side and end walls thereof extending downwardly from the horizontal top plate to conform with the size and shape of the engine body. In the drawing operation, openings *a'* are stamped to receive later the cylinders *d*, these openings being of such size and so placed relatively during the drawing operation as to receive the engine cylinders *d* and maintain them in proper fixed relation to each other and to the crank shaft. The lower section *c* of the crank case may also be formed in a drawing operation from a single sheet metal blank and have provided in its end walls semi-circular openings *c'* to receive the main bearings for the crank shaft. This

section may also be formed along its upper edge with a flange c^2 for contact with a corresponding flange b' formed on the lower edge of the upper section b of the crank case. This upper section of the crank case in the drawing operation is provided with a top wall in which are stamped a series of openings b^2 corresponding to the respective openings in the top wall of the engine section. These openings b^2 in the crank case section receive the lower ends of the cylinders d and with the corresponding upper openings hold the cylinders in the prescribed position. In forming the upper section b of the crank case, there is also stamped in the end walls thereof a semi-circular opening b^3 corresponding to the opening c' in the lower section for reasons which will be apparent. The section b may also have stamped in its side walls suitable hand holes b^4 .

The upper section of the engine body may be flared, as indicated at a^2 , to receive the upper portion of the crank case section b and insure a thorough and snug union between the two sections by reason of the large contacting bearing surfaces. These two sections a, b , may be permanently united when thus assembled, as by means of rivets f , or by any well known welding process. The two crank case sections b, c , when assembled to form the completed crank case, may have their contacting flanges b', c^2 , permanently united, either by means of rivets or by welding in the manner suggested above. The parts, when assembled, will form a permanent unitary structure which is light in weight and yet very strong and rigid. The completed engine is not open to the objections to be raised against cast metal, and yet both in manufacture and in use it embodies many advantages not to be found in cast metal. The three separate, integral sections united in the manner described have no line of weakness therein and their permanent lines of union fall at planes which facilitate the assembling of the parts, their final shaping, and the imposition of minimum stresses during use. The metal cylinders d , which may be of drawn tubing cut to length, may readily

be inserted in the openings in the upper wall of the two sections a, b and secured permanently therein as by welding or by any metal working union which may be most suitable. The space between the cylinders and the walls of the section a will constitute the usual jacket for the cooling water and an ample cooling space will be afforded.

No reference has been made herein to the cylinder head g since this head, containing the valves and their controlling mechanism for the most part, will be cast and applied to the completed motor as in the usual practice.

By the present invention, it is sought to cover a sheet metal internal combustion engine structure in which the motor is formed of three separate, integral sections of the general form described, and united along substantially the same planes pointed out, but it is to be understood that the invention is not to be limited to details of connections or dimensions.

I claim as my invention:

1. A sheet metal casing for an internal combustion engine having its cylinder section walls formed of a single integral drawn section including a horizontal top plate in which are stamped openings to receive the cylinders.
2. A sheet metal casing for an internal combustion engine having a crank case formed of integral drawn sections, the upper section having an integral, horizontal top plate in which are stamped openings to receive the cylinders.
3. A sheet metal casing for an internal combustion engine having its cylinder section walls formed of a single integral drawn section including an integral, horizontal top plate in which are stamped openings to receive the cylinders and a crank case formed of integral drawn sections, the upper crank case section having an integral, horizontal top plate in which are stamped openings alined with the openings in the top plate of the cylinder section to receive the cylinders.

This specification signed this 19th day of June, A. D. 1917.

ALEXANDER GRISWOLD HERRESHOFF.