

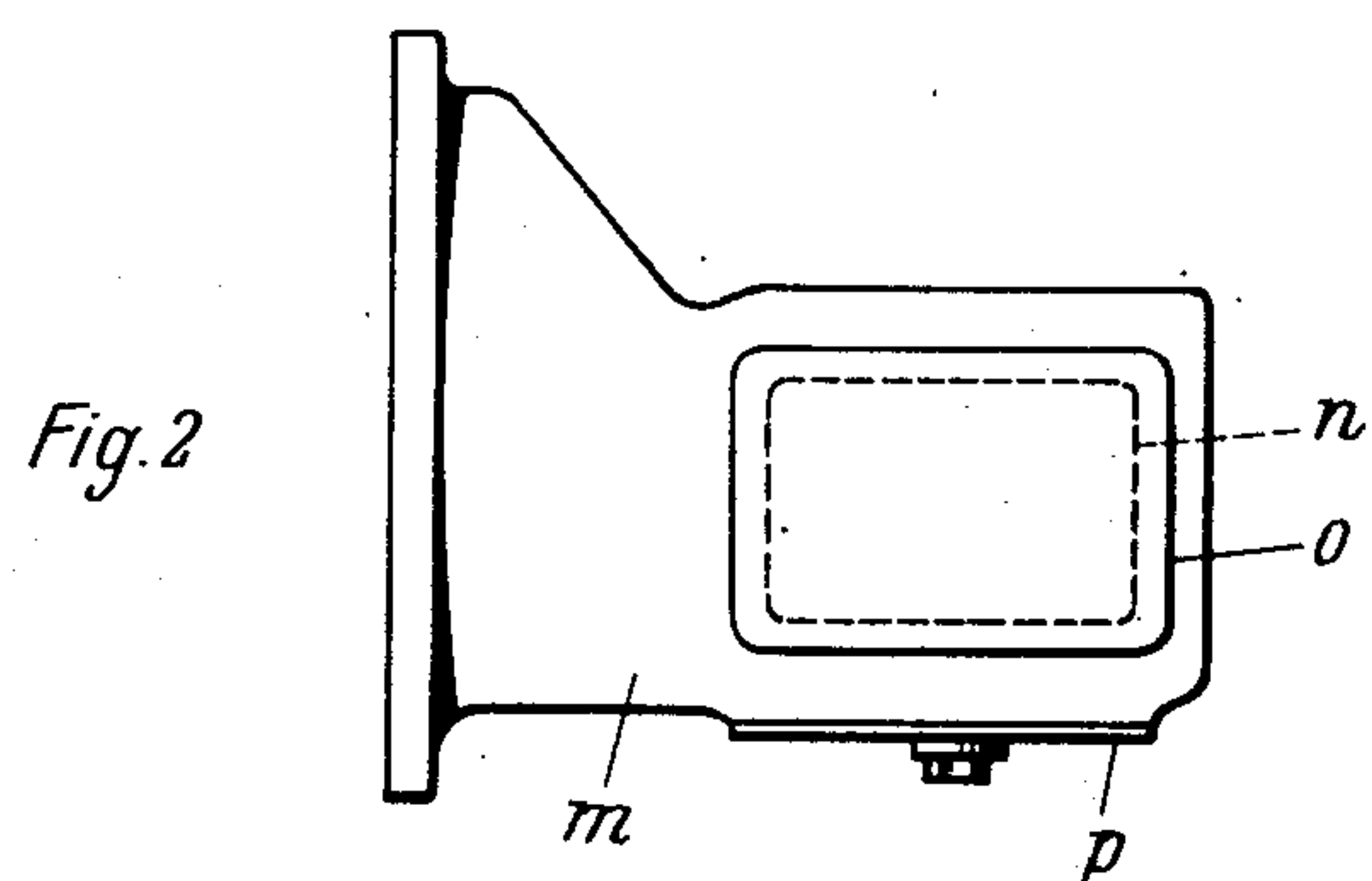
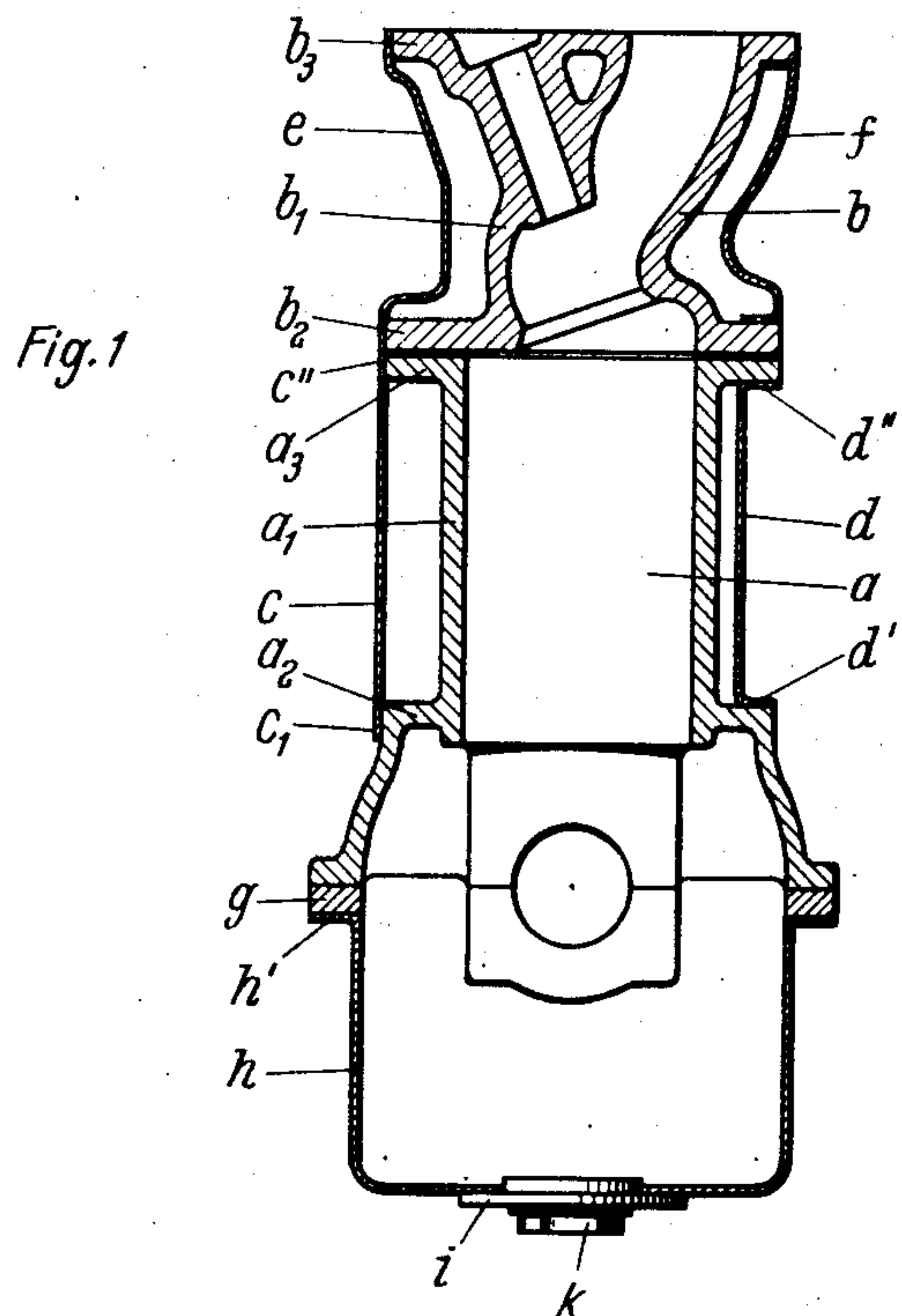
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ENGINE PART OR CASING

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ENGINE PART OR CASING

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The invention refers to the manufacture and development of power transmitting or power-receiving engine casings or engine parts, particularly of combustion engines, gears or the like.

More particularly, the present invention relates to novel and improved metal casings and the like, and the method of making the same by pasting, gluing or cementing metal covers and closure walls to the metal frame structure, particularly to the structure provided by internal combustion engine blocks forming jackets containing the cooling liquid.

An object of the invention is primarily to provide a simplified method of manufacturing such engine parts or casings.

A further object is to reduce the weight of the same. Another object is to provide a simple and inexpensive method of manufacturing water-proof casings.

In accordance with the above objects, it is an essential characteristic of the invention that walls, covers or the like having little or no strain are pasted on power receiving, bearing casings or framings. The bearing casing or framing can be manufactured as a casting, or as forged pieces, pressed pieces or the like. The invention provides particularly for pasting on such walls, covers or the like, which serve as closure or separating walls thereby forming subdivisions of spaces, pipings or the like, which may be filled entirely or in part with fluids.

In accordance with the above features and according to a further characteristic of the invention, a particularly advantageous application of the same consists in the fact that the cooling water jacket of a combustion engine is formed by such walls made for example of sheet metal. In the application of the invention to castings, pasted-on covers can be utilized in the place of plates screwed on as core-hole covers.

Further possible applications in accordance with the present invention resides in its use with gears, gear boxes and the like, which comprise fluid-tight covers for their respective openings, and which need not or must not be taken off during operation thereof, and which are pasted or glued on by means of adhesives or cements.

As a result of the present invention the following advantages are achieved: The parts which are glued or pasted together can be kept particularly light, in that they are manufactured for example of a particularly thin-walled sheet metal or of material with a low specific gravity. For example light metal or artificial material can be utilized herefor. However, the pasted on covers, walls or the like can also be manu-

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factured of sheet iron, of cast iron or other metals.

In applying the invention to castings, for example to the casing casting of a combustion engine, advantages result by the fact that by limiting the casting to the bearing walls, such as interior walls, a very simple casting can be achieved, which requires only relatively simple cores and which can be reliably and quickly cleaned from the outside. Thus the cylinder casing of the engine can be manufactured as a simple casting frame, which permits a profitable arrangement of core prints and the best exploitation of the casting.

In a similar manner as for castings, the invention can also be utilized with forged pieces, pressed pieces or the like. Metals can be connected with metals as well as metals with metal-loids, such as alloys.

For pasting or cementing the surfaces which are to be bonded together there is utilized as glue, cement, or adhesive, a material such as, for example, that known under the names of "Desmocoll" or "Desmodur." Such a glue or cement or adhesive is characterized by its hard condition, by its high stability and its high resistance against water, diluted acids and lyes, as well as against other atmospheric influences.

While Desmocoll and Desmodur are mentioned, it is to be noted that any adhesive or binding agent for holding metals together may be employed; other examples of such adhesives or binding agents are mentioned in United States Patents 2,304,718; 2,226,589; 2,117,085 and 2,376,854. Other suitable adhesives are described at pages 780-782 of "1950 Modern Plastics Encyclopedia and Engineer's Hand-book" published by Plastics Catalog Corporation, 122 E. 42nd Street, New York 17, New York. Among the plastics there described, suitable for the purpose, is "Plastilock," manufactured by B. F. Goodrich Company.

In accordance with the composition of the glues, which consist of fluids of low viscosity with or without organic solvents, a somewhat harder or a somewhat more elastic sizing can be achieved. The gluing is suitably carried out under exclusion of fluids and at an increased temperature, since thereby the solidity can be increased and the hardening can be considerably accelerated. During the gluing the parts to be glued together are suitably pressed against each other under an increased pressure of for example 3 to 4 kg./cm.² for a certain time after laying-on the glue.

As a consequence of the high resistance of the

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glue against water, acids and lyes, the invention can be utilized with special advantage everywhere, where a fluid-tight seal is to be achieved and a subsequent separation of the connection is normally not required.

In the drawing, two examples of application of the invention are shown in form of a diagram, i. e. Figure 1 shows a cross section through the casing of a combustion engine with exterior walls pasted on to the casing and Figure 2 shows an example of an application of the invention for change gear or transmission casings.

In the example shown in Figure 1, the casting *a* of the cylinder casing consists for the main part of the cylinder walls *a*₁ forming the piston tracks, of the lower and upper shutting off or end walls *a*₂ and *a*₃ for the cooling water jacket, and of the walls extending outwardly and forming the upper half for the crank case and the bearings for the crankshaft. In a similar manner the cylinder head casting *b* is formed for the main part by the valve groove walls *b*₁ with the valve guides, a lower shutting off wall or end wall *b*₂ and an upper shutting off wall or end wall *b*₃ formed by flanges in the cylinder head extending outwardly in substantial parallel relations to end walls *a*₂ and *a*₃.

In contrast to this the outside walls of the cooling water jacket are not formed by the castings, but are formed for example by sheet metal plates *c*, *d*, *e* and *f*, which are pasted onto the end walls *a*₂, *a*₃, and *b*₂, *b*₃ respectively of the castings. The drawing shows thereby different possibilities for pasting on the sheet metal plates. Thus for example the sheet metal *c* is formed as a plain plate, which is pasted onto the side faces of end walls *a*₂ and *a*₃ at *c*₁ and *c*'. The sheet metal *d* is bent at its ends towards the outside in a flange-like manner and inserted between the horizontal surfaces of the end walls *a*₂ and *a*₃, whereby provision can be made for an appropriate play or tolerance of for example one or also several millimeters between the flanges of the sheet metals and those of the end walls, which is filled by the hardening and tightening glue. The form of construction of the sheet metal has the advantage that the volume formed by the cooling water jacket is limited to the utmost necessary measure thereby achieving a further reduction of weight of the engine.

For similar reasons, the pasted-on sheet metals can be shaped in adaptation to the contours of the inside walls as it is for example indicated by the sheet metals *e* and *f*. The sheet metal *e* is thereby pasted like the sheet metal *c* from the side onto the edges of the end walls *b*₂ and *b*₃, while the sheet metal *f* is inserted between the end walls with inward directed flanges which are glued to flanges *b*₂ and *b*₃.

A further possibility of application of my invention resides, for example, in its use as the lower half wall for the crankcase of the engine. The trough-like shaped sheet metal *h* is pasted at *h'* onto the flange *g*, which can for example be constructed as a casting, as a pressed piece or in another suitable manner. To the sheet metal trough *h*, for example, a thread piece *i* may be pasted, which can contain a threaded stopper *k*, which may be unscrewed, for example for purposes of draining off of the oil.

In the place of walls *c*, *d*, *e*, *f* and *h* consisting of iron, light metal or other sheet metal plate, also walls consisting of suitable artificial material can be utilized, if required.

Figure 2 shows furthermore a change gear or

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transmission casing *m* for a motor vehicle, which is for example of reduced weight provided with openings or windows at the side, which are closed towards the outside by covers *o* pasted or glued onto the casing. Furthermore provision can be made for example at the lower side of the gear or at another suitable place for glued wall parts or covers *p*. In a similar manner, for example, openings in the rear axle gear housing or in other gear housings respectively, in other castings, casings or other power generating, power delivering or power transmitting engines or engine parts can be closed off by pasting, gluing or cementing on cover plates, etc. The invention is also applicable in a suitable manner to other casings, framings, castings or similar parts.

What I claim is:

1. A metallic cylinder block for internal combustion engines comprising cylinder walls having upper and lower, outwardly extending end walls, a plurality of sheet metal plates, and means for cementing said sheet metal plates to said end walls in fluid-tight relation thereto whereby said cylinder walls, said end walls and said sheet metal plates form jackets for receiving cooling liquid for said engine.

2. A metallic cylinder block for internal combustion engines comprising cylinder walls having upper and lower, outwardly extending walls, a cylinder head on said block including upper and lower outwardly extending end walls in substantial parallel relation to said first mentioned end walls, a plurality of sheet metal means, and means for cementing said sheet metal means to said end walls in fluid-tight relation thereto whereby said cylinder walls, said cylinder head, said end walls, and said sheet metal means form jackets for receiving cooling fluid for said engine.

3. A metallic cylinder block enclosing moving parts comprising main walls including supporting and guiding walls for said moving parts, flanges outwardly extending from said main walls and forming an integral part therewith, sheet metal means, and heat resistant, fluid-tight cementing means for securing said sheet metal means to the edges of said flanges whereby said main walls, said flanges and said sheet metal means form jackets for receiving cooling liquid.

4. A liquid-cooled cylinder block having cast cylinders and a crank case part cast onto said cylinders comprising cylinder walls having outwardly extending end walls, sheet metal plates, and means for cementing said sheet metal plates to the edges of said outwardly extending end walls whereby said cylinder walls, said outwardly extending end walls, and said sheet metal plates form jackets for receiving cooling liquid for said cylinder block, said cementing means being heat-resistant and forming a fluid-tight seal between said end walls and said sheet metal plates.

5. In an internal combustion engine, a cylinder casting including cylinder walls having upper and lower outwardly extending end walls, a cylinder head casting on said cylinder casting forming valve guides therein and including lower and upper outwardly extending end walls, first sheet metal means, means for cementing said first sheet metal means to the edges of one of the upper and lower end walls of said cylinder walls on one side thereof, second sheet metal means, means for cementing said second sheet metal means to the edges of one of said lower and upper end walls of said cylinder head on one side thereof, third sheet metal means, means for cementing said third sheet metal means to the

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other upper and lower end walls of said cylinder walls on the other side thereof, fourth sheet metal means, and means for cementing said fourth sheet metal means to the other upper and lower end walls of said cylinder head on the other side thereof, said sheet metal means forming jackets with said cylinder walls, said cylinder head and with said end walls to receive cooling liquid for said engine.

6. A cast metal block for internal combustion engines having moving parts housed therein comprising a plurality of main walls having outwardly extending upper and lower flange-like portions, a plurality of sheet metal plates, and fluid-tight, heat-resistant means for cementing

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each of said sheet metal plates to at least one of said upper and lower flange like portions in fluid-tight relation thereto whereby the main walls, the flange like portions and the sheet metal plates form water cooling jackets.

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