June 4, 1929. M. BIRKIGT 1,716,256

CYLINDER BLOCK ASSEMBLY

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Fig. 1.

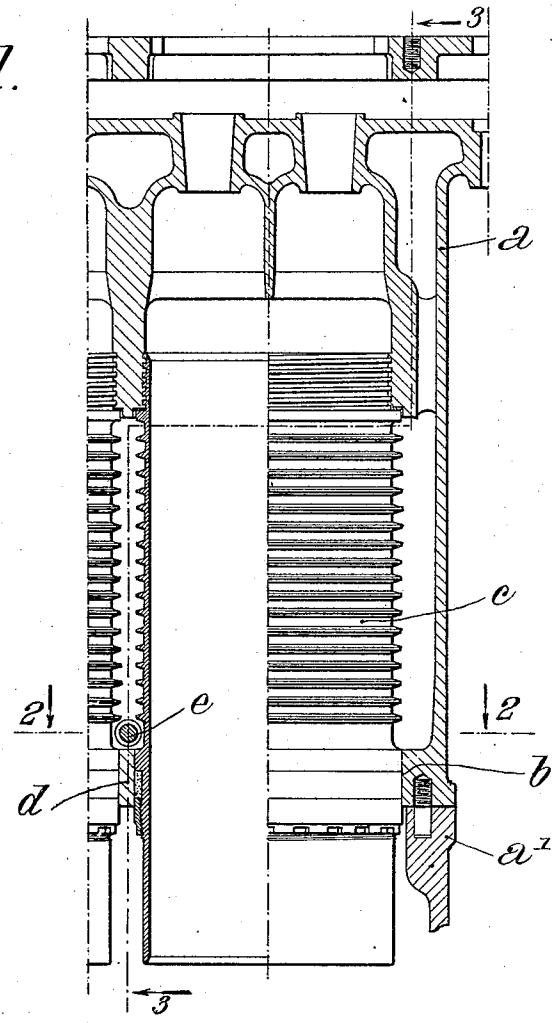
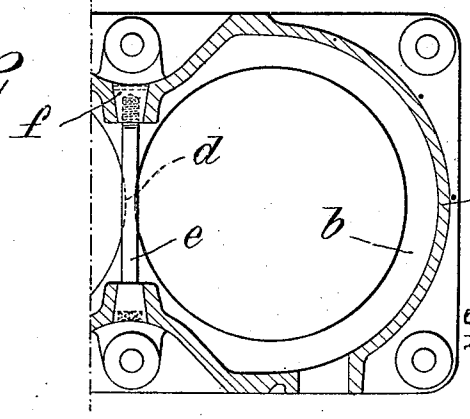


Fig. 2



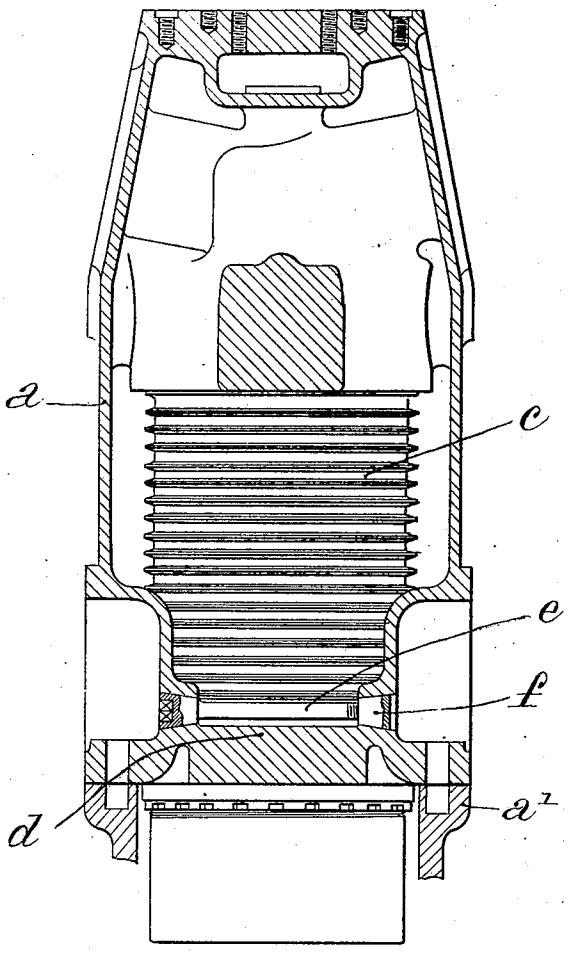
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CYLINDER BLOCK ASSEMBLY

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Fig. 3.



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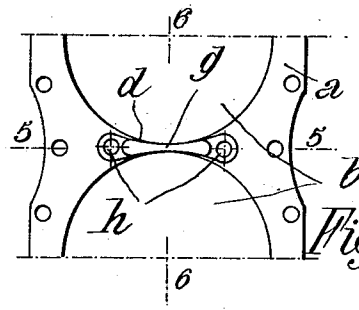


Fig. 4.

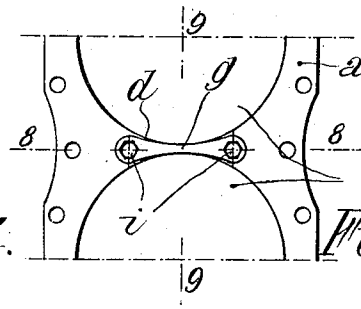


Fig. 7

Fig. 5.

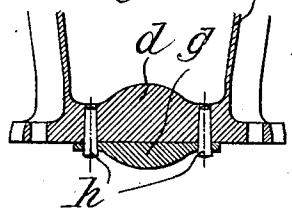


Fig. 6

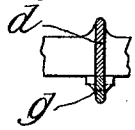


Fig. 8.

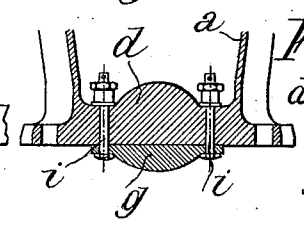


Fig. 9.

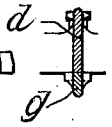


Fig. 10.

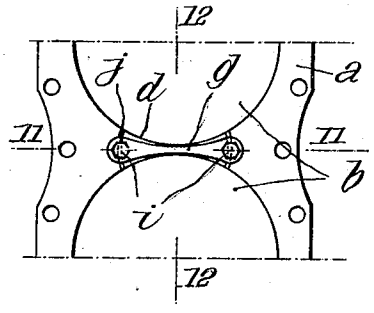


Fig. 13.

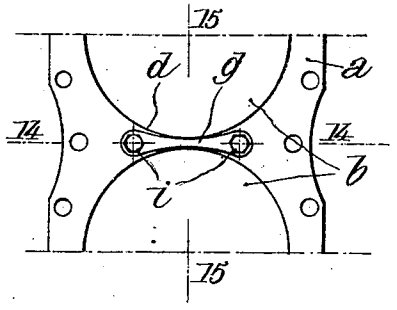


Fig. 11.

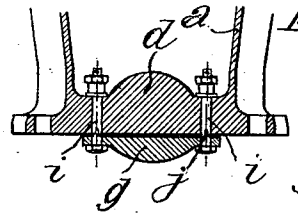


Fig. 12.

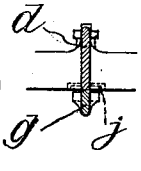


Fig. 14.

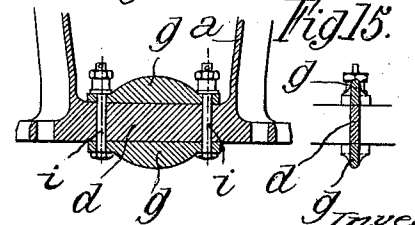


Fig. 15.

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UNITED STATES PATENT OFFICE.

MARC BIRKIGT, OF BOIS COLOMBES, FRANCE.

CYLINDER-BLOCK ASSEMBLY.

Application filed June 14, 1928, Serial No. 285,436, and in Belgium October 20, 1927.

The present invention relates to cylinder-block assemblies and, more particularly, to a special manner of mounting a plurality of cylinder shells in a water-jacket or similar casing.

One of the major desiderata in the design of assembled cylinder blocks is to reduce the distance between cylinder center lines to a minimum so as to reduce the length of this portion of the motor. The main limitation to a too compact cylinder assembly is the necessity of providing a sufficient thickness of metal between adjoining cylinders to resist the stresses transmitted by the unequal expansion of the various elements of the cylinder block assembly during motor operation and particularly by the unequal expansion of the crank case and the water-jacket casting.

One of the objects of the invention is to provide a reenforcing system permitting reduction of the space between cylinders to dimensions considerably less than those heretofore employed.

Other objects will appear in the course of the detailed description now to be given with reference to the accompanying drawings, in which:—

Fig. 1 is a partial section passing through the longitudinal center line of one form of cylinder-block assembly constructed in accordance with the invention;

Fig. 2 shows the same block in a section taken on line 2—2 of Fig. 1;

Fig. 3 illustrates the same assembly as seen in a section passing through line 3—3 Fig. 1;

Fig. 4 is a partial section as seen from below of a reenforcing system differing from that shown in Fig. 1;

Fig. 5 is a section taken on line 5—5 of Fig. 4;

Fig. 6 represents a section along line 6—6 of Fig. 4;

Fig. 7 represents another reenforcing assembly in a manner similar to the one shown in Fig. 4;

Figs. 8 and 9 are sections taken on lines 8—8 and 9—9 respectively of Fig. 7;

Fig. 10 shows another variant of the devices similarly represented in Figs. 4 and 7;

Figs. 11 and 12 are sections on lines 11—11 and 12—12 of Fig. 10;

Fig. 13 is still another variant of the reenforcing devices similarly illustrated in Figs. 4, 7 and 10;

Figs. 14 and 15 are sections on lines 14—14 and 15—15 of Fig. 13.

Referring to Figs. 1 to 3 of the drawings, a represents a water (or other form of) jacket cast in one piece of aluminium or any other metal and having a lower wall traversed by a plurality of machined openings b adapted to coact with corresponding machined surfaces formed on the outside of cylinder shells c. Jacket casting a is provided with threaded recesses adapted to receive bolts for attaching crank-case a^1 thereto. The metal "bridges" d forming part of casting a and separating adjoining cylinder shells as desired at their central portions i. e. if the strength of the metal and the motor design so permits, only just thick enough to permit machining of limiting surfaces b. To compensate for the weakness of each "bridge" d, a transverse bolt e having its head embedded in casting a and a similarly anchored nut f are mounted near each "bridge" (Fig. 3).

From the foregoing, it is evident that the distance between adjoining cylinders may be greatly reduced and the length of the cylinder block correspondingly shortened.

The various devices shown in Figs. 4 to 15 show possible variants of the reenforcing assembly a, e, f described in connection with Figs. 1 to 3.

In the form of device illustrated in Figs. 4 to 6, bolt and nut e, f are replaced by a transverse reenforcing element g hollowed out on each side to conform to the shape of cylinders c and having an increased central height designed to make up for any deficiency in its central strength. The ends of element g may be embedded in casting a in the manner illustrated in Figs. 1 to 3, or they may be attached to "bridges" d by conical wedges h or other fastening means.

The device shown in Figs. 7 to 9 differs from the one represented in Figs. 4 to 6 only in the use of bolts and nuts i as fastening means.

In Figs. 10 to 12 the bolt and nut fastening means is rigidly held in place by pins j traversing elements d and i.

In the structures illustrated in Figs. 4 to 12, elements d are formed with a portion of in-

creased thickness roughly symmetrical to reenforcing elements *g*. In the modification shown in Figs. 13 to 15, this portion of increased thickness is replaced by a detachable element *g* having a shape similar to or identical with elements *g* shown in Figs. 4 to 12.

It is, of course, impossible to indicate just what thickness "bridges" *d* should have since this varies with the motor design, the nature of the metal forming the water-jacket casting etc., etc. Reenforcing elements *e* should be placed near "bridges" *d* so as to (1) offer a maximum reenforcing effect and (2) oppose the stresses transmitted to casting *a* by crankcase a^1 which is at a higher temperature than *a* and expands more rapidly than the latter.

What I claim is:—

1. In a motor assembly, a block adapted to receive a plurality of cylinder shells, a plurality of cylinder shells mounted in said block, and means for reenforcing the strength of portions of said block positioned between adjacent cylinder shells.

2. In a motor assembly, a block adapted to receive a plurality of cylinder shells, a plurality of cylinder shells mounted in said block, and a reenforcing element anchored in said block and extending across the space between adjacent cylinder shells.

3. In a motor assembly, a block having a plurality of orifices formed therein each adapted to receive a cylinder shell, each pair of said orifices limiting a separating "bridge", cylinder shells mounted in said orifices, and a reenforcing element positioned adjacent said "bridge" and operative to oppose stresses transmitted to the latter.

In testimony whereof I have hereunto set my hand.

MARC BIRKIGT.