June 14, 1949. E. A. WEISS 2,473,185

FLUID COUPLING WITH UNITARY DIE CAST VANE STRUCTURE

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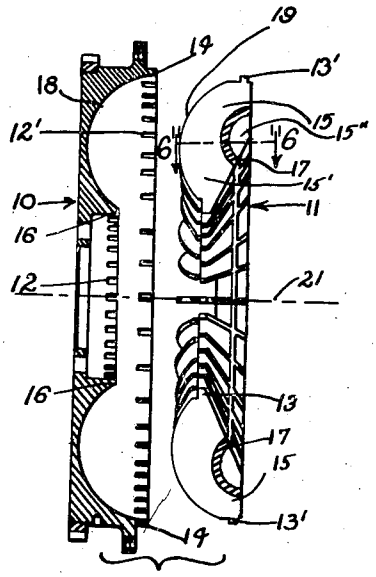


FIG. 1

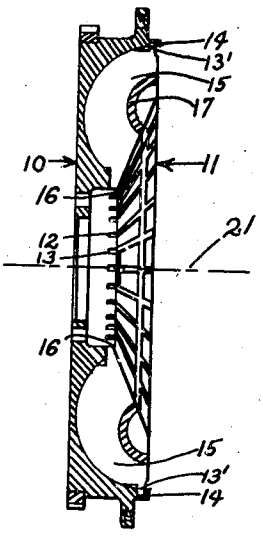


FIG. 2

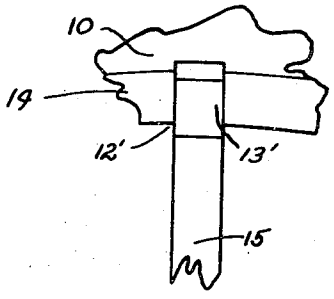


FIG. 4

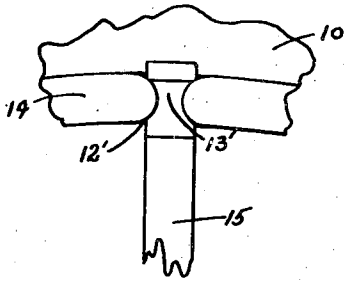


FIG. 5

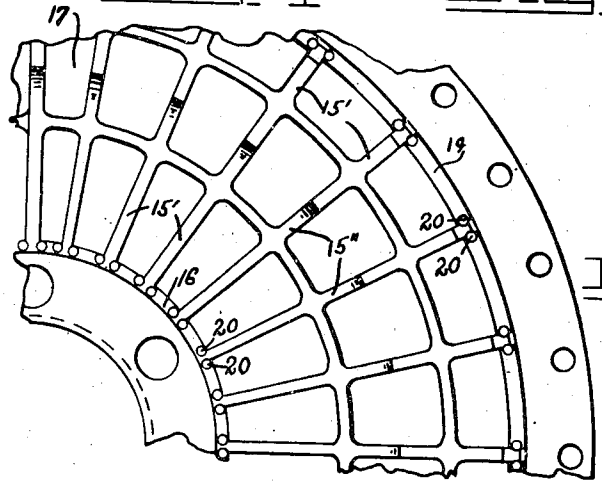


FIG. 3



FIG. 6

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FLUID COUPLING WITH UNITARY DIE CAST VANE STRUCTURE

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6 Claims. (Cl. 103—115)

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This invention relates to fluid couplings and particularly to the construction of the operating parts thereof.

One of the drawbacks to the greater use of fluid couplings has been the difficulties experienced in connection with the manufacture and assembly of the parts thereof. In general, the vaned members of couplings have been so formed that they must be sand cast or built up of a multiude of stamped parts, all of which means high labor cost in cleaning and polishing the surfaces or in assembling and welding together the numerous parts, or both.

It is one of the objects of the present invention to so design one of the operating units of a fluid coupling that the vane member thereof may be die cast with smooth surfaces and the supporting member of the unit day form a guide wall that would otherwise be a part of the vanes, to thereby permit the vane member to be die cast.

It is a further object of the invention to so design a fluid coupling that one of the vane members thereof will have its vanes connected by a single torus, preferably positioned intermediate the ends of the vanes, and all other edges of the vanes will be free, so that the vane member may be die cast, the vanes being tapered in thickness to permit the dies to be withdrawn.

Another object of the invention is the production of a fluid coupling member from two parts connected together at the inner and outer ends of the vanes.

Another object of the invention is the formation of a fluid coupling member in which the segmental vanes are connected by a torus and the opposite wall for the vanes is separately formed whereby the vanes and torus may be die cast as a unit.

Other objects of the invention will appear from the following description taken in connection with the drawing, which forms a part of this specification, and in which:

Fig. 1 is an exploded view of a fluid coupling impeller with the two separated parts thereof being shown in section;

Fig. 2 is a sectional view of an impeller member showing the two parts thereof assembled;

Fig. 3 is an enlarged, fragmentary face view of an impeller member showing the vanes and peening points;

Fig. 4 is an enlarged fragmentary face view of the assembly prior to securing one part to the other;

Fig. 5 is a similar view to Fig. 4 after one part has been secured to the other; and

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Fig. 6 is an enlarged cross-section taken on the line 7—7 of Fig. 1, showing the draft angle of the vanes.

The invention is shown embodied in the impeller portion of a fluid coupling, in which the impeller is formed of two parts which are permanently connected together. The supporting part of the impeller may be made by sand casting and may form the flywheel of an internal combustion engine, but the vane part is so designed that it may be die cast and may then be fitted into the supporting part and secured thereto to form the impeller portion of a fluid coupling.

Referring to the drawings, the rotatable supporting member is represented at 10 and the vane member is indicated at 11. These two members are formed separately and they are shown separated from each other in Fig. 1. In Fig. 2 they are joined into a unitary structure.

The member 10 is dished or formed in its face with a doughnut-shaped depression 18. In cross section this depression is shown as substantially segmental and almost semi-circular. Adjacent the inner rim 16 of the depression the member 10 is formed with a series of spaced radially extending slots 12, and adjacent the periphery or outer rim 14 of the depression is a series of radially extending slots 12', preferably corresponding to or aligned with the slots 12.

The member 11, that is, the vane member, comprises a series of radially arranged arcuate shaped vanes or blades 15. These vanes are spaced circumferentially and are connected at intermediate points by a foundation or bridging means 17 which is shown in the form of a segmental torus of concavo-convex form in cross sections from both sides of which the vanes 15 extend. Thus, there are vane portions 15' radiating from the torus 17 and there are vane portions 15'' extending inwardly of the segment of the torus.

It will be noted that the bridging means 17 is less than a half circle, and upon reference to Fig. 6, which is taken on the line 6—6 of Fig. 1, it will be seen that each of the vanes, that is, the portions 15' and 15'', are tapered slightly in a direction parallel to the axis 21 of the vane member or the axis of the impeller member in its assembled condition. Thus the vane member 11 may be formed by die casting and the dies may be withdrawn axially of the vane member. Because the vane member may be die cast, the numerous surfaces will be smooth and only a polishing operation will be required.

It is possible to form the vane member 11 with but a single bridging means, such as the means 17 shown in Figs. 1 and 2, thus leaving all of the outer edges of the vanes free, because the vane member is adapted to be fitted into the supporting member 10 which will form the other guide wall of the impeller. Thus the vane member 11 has inward extensions or tabs 13 formed on some or all of the vanes or blades 15, and there are also outward extensions or tabs 13' for some or all of the vanes. The tabs 13 extend radially inward and are so positioned that they will enter the slots 12 in the member 10 and the tabs 13' extend radially outward and are so positioned that they will register with and enter the slots 12' in the member 10. It will be seen that the connection of the vane member 11 so that it will turn with the supporting member 10 is at the extreme ends of the vanes 15 thus providing the strongest support for the vanes.

The outer free edges of portion 15' of the vanes 15 are curved to fit the arc shaped guide wall of the depression 18 in the member 10 and when the member 11 has been positioned within the member 10 as shown in Fig. 2, a permanent connection of the two parts is made by peening over or otherwise deforming a portion of the metal between the slots 12 and 12', as shown at 20 in the various figures. This forms a rigid and permanent connection between the two parts so that there can be no relative shifting in the rapid rotation of the impeller.

It will be understood that various forms of the invention other than that described above may be used without departing from the spirit or scope of the invention.

What is claimed is:

1. A fluid coupling vane member suitable for die-casting comprising a plurality of radially extending vanes, bridging means forming the sole integral support of said vanes, said means connecting the vanes at an intermediate point so that the vanes project from two sides of the bridging means, and said vanes tapering parallel with the axis of rotation of the vane member in both directions from said bridging member to their free edges.

2. A one-piece die cast vane member adapted to form part of a fluid coupling comprising a plurality of vanes held in radial, circumferentially spaced relation by means of bridging portions between adjacent vanes, said bridging portions being of concavo-convex form and disposed in circumferential alignment, the respective vanes extending axially on both sides of said bridging portions and being tapered on the concave side of said bridging portions.

3. A one-piece die cast vane member adapted to form part of a fluid coupling comprising a plurality of vanes held in radial, circumferentially spaced relation by means of bridging portions between adjacent vanes, said bridging portions being of concavo-convex form and disposed in circumferential alignment, the respective vanes being tapered on both the convex and concave sides of said bridging portions.

4. The improvement in fluid couplings comprising an annular member having a split doughnut-shaped depression therein and having radial slots adjacent the periphery of the depression, and a member having vanes received in the depression and having tabs extending into the slots, the edges of the slots being deformed to close the slots partially over the tabs, thereby locking the vanes to the annular member.

5. The improvement in fluid couplings comprising a rotatable member having a split doughnut-shaped depression therein and having radial slots adjacent the periphery of the depression, and a member having vanes fitting the depression and having tabs extending into the slots, the edges of the slots extending over the tabs to lock the tabs in the slots.

6. The improvement in fluid couplings comprising a rotatable member having a split doughnut-shaped depression therein and having radial slots both adjacent the periphery of the depression and adjacent the inner rim of the depression, and a member having vanes fitting the depression and having tabs extending into both the peripheral and the inner rim slots, the edges of said peripheral and inner slots extending over the tabs to lock the tabs in the slots.

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