April 1, 1969 A. L. ASCUITTO ET AL 3,435,778

ADAPTER FOR MOUNTING HYDRAULIC PUMP

Filed Aug. 15, 1967

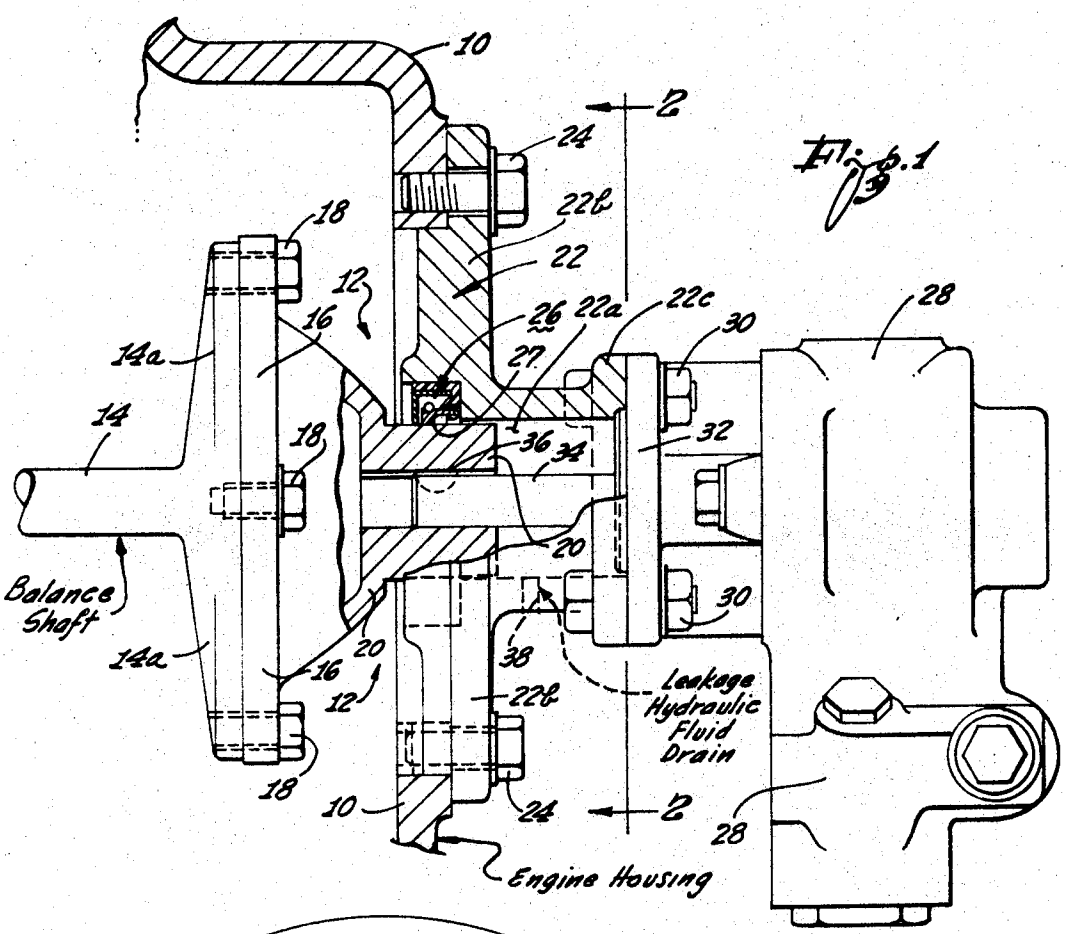


Fig. 1

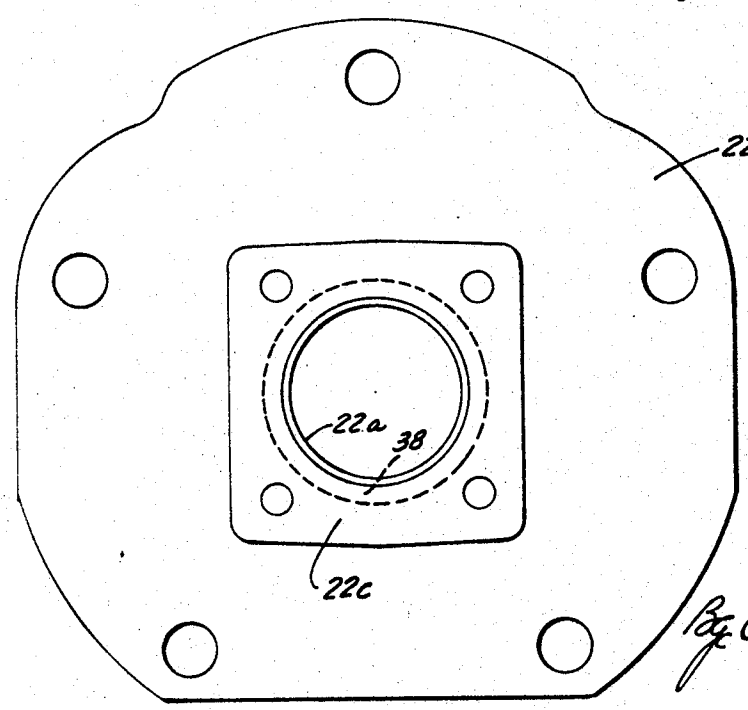


Fig. 2

INVENTORS:
Anthony L. Ascuitto
Vito F. Romani

By Warren T. Jessup
ATTORNEY

United States Patent Office 3,435,778 Patented Apr. 1, 1969

3,435,778

ADAPTER FOR MOUNTING HYDRAULIC PUMP

Anthony L. Ascuitto and Vito J. Romani, San Diego, Calif., assignors to National Pump & Injector Sales & Service, San Diego, Calif., a corporation of California

Filed Aug. 15, 1967, Ser. No. 660,708
Int. Cl. F04b 17/00; F02n 7/00
U.S. Cl. 103—218 4 Claims

ABSTRACT OF THE DISCLOSURE

An improved mounting bracket is described herein, which is used for mounting an hydraulic starting pump on the housing of a marine diesel engine, and to permit an auxiliary drive shaft in the engine to be directly coupled to the actuating shaft of the pump.

Background of the invention

It has been usual in the past to start the smaller diesel marine engines by means of a usual electric starter. For this purpose, one of the auxiliary drive shafts such as the balnece shaft in the diesel engine has usually been used to drive a pulley which, in turn, is coupled by a belt to an electric generator in the electric starter circuitry. The electric generator maintains a charge on the storage battery which, in turn, is used to energize the electric starter.

In recent years, it has been found more expedient to use compressed air for starting such marine diesel engines. For that reason, the aforesaid generator has been replaced by an hydraulic pump. The purpose of the pump is to pump hydraulic fluid into a accumulator, and thereby build up air pressure in the accumulator. When the air pressure in the accumulator drops below a selected threshold, for example, during starting of the diesel engine, the pump retains the air pressure to the desired level, after the engine has started and drives the pump. A simple bypass is provided for the hydraulic fluid after the selected air pressure has been reestablished in the accumulator, all in a manner well understood in the art.

Problems have been encountered, however, when it was attempted to couple the aforesaid hydraulic pump to the diesel engine balance shaft. The balance shaft in one common type of diesel engine, for example, terminates inside the engine housing in a relatively large rotatable flange. In order to drive the generator in the eariler installations using electric starters, another flange was coupled to the aforementioned flange in facing coaxial relationship, and the latter flange was provided with a short stub extension shaft.

The stub extension shaft extended along the axis of rotation of the balance shaft and out the end of the engine. The aforesaid pulley was mounted on the stub shaft, originally to drive the generator in the earlier electric starter system. It was the practice in the past, when the electric starter was replaced by an hydraulic pump compressed air starting system, to drive the hydraulic pump by means of a belt drive from the pulley on the stub extension shaft. This proved to be somewhat unsatisfactory due to slippage and installation complications. Therefore, attempts have been made in the past to direct-couple the stub shaft to the hydraulic pump. However, even these latter direct couplings in the past have invloved complications and have proven to be generally unsatisfactory. Moreover, the previously used direct couplings often result in the leakage hydraulic fluid from the pump entering the engine housing and being mixed with the engine oil to form a harmful mixture within the engine.

Summary of the invention

The present invention provides an improved and simple coupling and adapter bracket, whereby the hydraulic pump for the compresed air starting system may be rigidly and securely mounted on the housing of the diesel engine, and whereby the pump may be direct-coupled to the balance shaft of the engine without the need for flexible couplings, or the like. Moreover, the improved coupling and adapter bracket of the invention is such that there is no tendency for any leakage hydraulic fluid from the pump to enter the housing of the engine.

Brief description of the drawings

FIGURE 1 is a side sectional view showing the bracket of the invention mounted in place on the end of a diesel engine; and

FIGURE 2 is an end view of the bracket, taken essentially along the line 2—2 of FIGURE 1.

Description of one embodiment of the invention

Only those portions of the diesel engine which are significant in explaining the improved coupling bracket of the invention have been shown in FIGURE 1. As described above, the diesel engine has a housing **10**. The housing, in turn, has an opening **12** at one end which normally is covered by an appropriate cover plate.

It is usual in the marine diesel engine to incorporate auxiliary crankshafts on either side of the main crankshaft. One of these crankshafts, as mentioned above, is designated the "balance" shaft, and has been used in the past to drive the electric generator in the electric starting system of the installation. A portion of the balance shaft of the engine is designated **14** in FIGURE 1. It will be understood, of course, that the balance shaft **14** is rotatably driven when the engine is operating.

A flange **14***a* is mounted at the end of the balance shaft **14**, and this flange rotates coaxially with the balance shaft. A second flange **16** is secured to the flange **14***a*, for example, by means of bolts **18**. The flange **16** is coupled to the flange **14***a* in facing relationship, as shown in FIGURE 1. A stub shaft **20** is formed integral with the flange **16**, and when the flange **16** is coupled to the flange **14***a*, as shown in FIGURE 1, the stub shaft **20** is precisely positioned for rotation about the axis of rotation of the balance shaft **14**.

As explained above, in the previous asemblies, a cover plate was provided across the opening **12** in the end of the engine housing **10**, and the stub shaft **20** extended through an opening in the cover plate. Appropriate oil seals were provided to seal the stub shaft **20** to the cover plate. In the practice of the present invention, the cover plate is removed, and the cover plate is replaced by an adapter mounting and coupling bracket **22** constructed in accordance with the concepts of the present invention.

The adapter bracket **22** includes a central hollow boss-like body portion **22***a* which receives the stub shaft **20**. The bracket also includes a first flange **22***b* which is formed integral with the body portion **22***a* at the left hand end of the body portion. The flange **22***b* is mounted on the engine housing **10** by means, for example, of appropriate bolts **24**. The bolts **24** may be the same bolts which previously held the cover plate on the housing in the prior art installation.

A counterbore **26** is provided at the left hand end of the boss-like body portion **22***a* adjacent the flange portion **22***b*. The counterbore **26** receives, for example, a flexible oil seal **27** which may be composed, for example, of rawhide, or the like. The seal **27** serves effectively to seal the stub shaft **20** to the adapter bracket **22**.

A second flange **22***c* is formed integral with the right hand end of the boss-like body portion **22***a*. An hydraulic

pump **28** is mounted on the flange **22***c* by means, for example, of appropriate bolts **30**. The bolts **30** extend through a flange **32** on the pump and through the flange portion **22***c* of the adapter bracket **22**.

The pump **28** has an actuating shaft **34**, and when the pump is mounted in position, as illustrated in FIGURE 1, the shaft **34** extends into the body portion **22***a* of the adapter bracket, in axial relationship with the stub shaft **20**, and into the stub shaft, as shown, the stub shaft having a hollow tubular configuration so as to receive the actuating shaft **34**. The tubular stub shaft **20** is provided with an internal longitudinal keyway which receives a key **36**. The key **36** is coupled to the actuating shaft **34** of the pump, so that the stub shaft **20** may drive the actuating shaft **34**.

It will be appreciated that any hydraulic fluid which may leak from the pump **28** into the interior of the bracket **22** has no tendency to flow into the engine housing **10** in the illustrated assembly of FIGURE 1. A drain **38** is provided in the boss-like body portion **22***a* of the coupling bracket, and this drain extends radially through the wall of the body portion. An appropriate conduit may be coupled to the drain **38**, so as to convey any hydraulic fluid which may enter into the body portion **22***a* back to the sump of the pump **28**.

It will be appreciated that the improved adapter bracket of the invention rigidly and securely mounts the pump **28** on the end of the engine housing **10**. The mounting of the pump by the bracket is positive and secure, with the actuating shaft **34** of the pump being precisely aligned with the stub shaft **20**, such that no flexible coupling is required in order for the balance shaft **14** to drive the pump **28**.

Any hydraulic fluid which may leak from the pump **28** into the boss-like body portion **22***a* of the adapter bracket passes down through the drain **38** and back to the sump of the pump. In this way, three is no tendency for the hydraulic fluid to enter the engine housing and form a harmful mixture with lubricating oil in the diesel engine itself.

As described above, the hydraulic pump **28** pumps hydraulic fluid into an accumulator in order to build up air presure in the accumulator. When a selected air pressure has been reached, and in a manner known to the art, an automatic bypass opens up and unloads the pump. However, whenever the pressure drops in the accumulator, the pump automatically acts to return it to the original selected pressure.

The improved mounting bracket of the invention provides, therefore, a simple and rugged one-piece mounting means for the pump, whereby the actuating shaft of the pump is precisely and accurately aligned with the stub shaft for a positive and direct-coupling between the stub shaft and the pump. The bracket of the invention is simple to mount, in that in many applications it merely replaced the cover plate originally mounted on the engine.

While a particular embodiment of the invention has been described, it is clear that modifications may be made. It is intended, therefore, in the claims to cover all modifications which come within the scope of the invention.

What is claimed is:

1. An adapter bracket for mounting a pump on the end of an engine, said engine having a rotatable stub shaft coupled to a drive shaft therein, and said pump having an actuating drive shaft, said adapter bracket comprising:

a hollow boss-like body portion;

a first flange at one end of said boss-like body portion and configured to be mounted on the end of the engine with said hollow body portion coaxial with the axis of rotation of said stub shaft and with said stub shaft extending into said body portion; and

a second flange at the other end of said boss-like body portion and configured to have the pump mounted thereon in position so that said actuating drive shaft of the pump extends into said hollow boss-like body portion in coaxial relationship with said stub shaft and into keyed relationship with said stub shaft.

2. The adapter bracket defined in claim **1**, in which said first and second flanges are integral with said boss-like body portion.

3. The adapter bracket defined in claim **1** and which includes a counterbored section at one end of said body portion adjacent said first flange for receiving a seal effective to seal said stub shaft to the adapter bracket.

4. The adapter bracket defined in claim **2** and which includes a drain for hydraulic leakage fluid from the pump, said drain being formed radially in said body portion and extending through the wall thereof.

References Cited

UNITED STATES PATENTS

1,633,767	6/1927	Christensen	230—39
1,794,088	2/1931	Moorhouse	230—39

ROBERT M. WALKER, *Primary Examiner.*

U.S. Cl. X.R.

103—150