

[54] **ENGINE ACCESSORY ARRANGEMENT**

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[22] Filed: **Oct. 29, 1971**

[21] Appl. No.: **193,652**

[52] U.S. Cl. **123/41.44, 123/195 A, 123/198 R**

[51] Int. Cl. **F01p 5/10**

[58] Field of Search **123/41.44, 195 A, 123/198 R**

[56] **References Cited**

UNITED STATES PATENTS

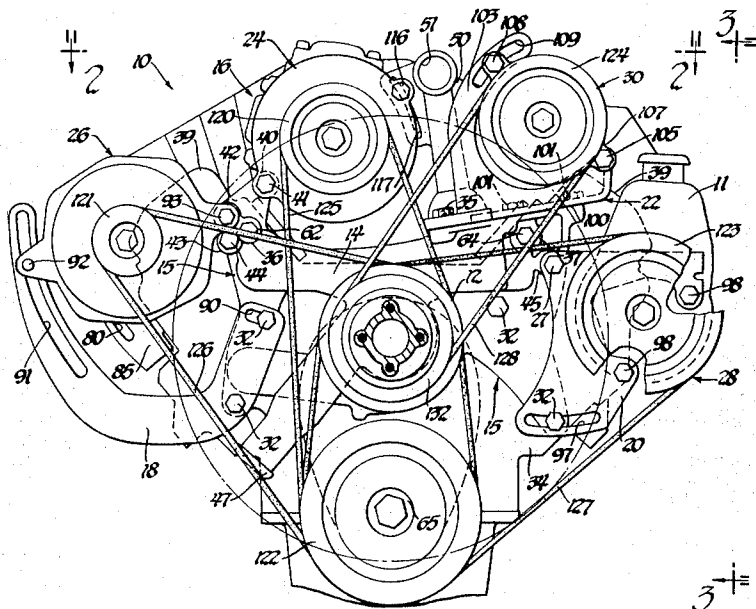
2,495,401	1/1950	Worthington	123/41.44
2,506,547	5/1950	Findley	123/41.44
2,713,332	7/1955	Beardsley	123/41.44
2,875,746	3/1959	Brice et al.	123/195 A

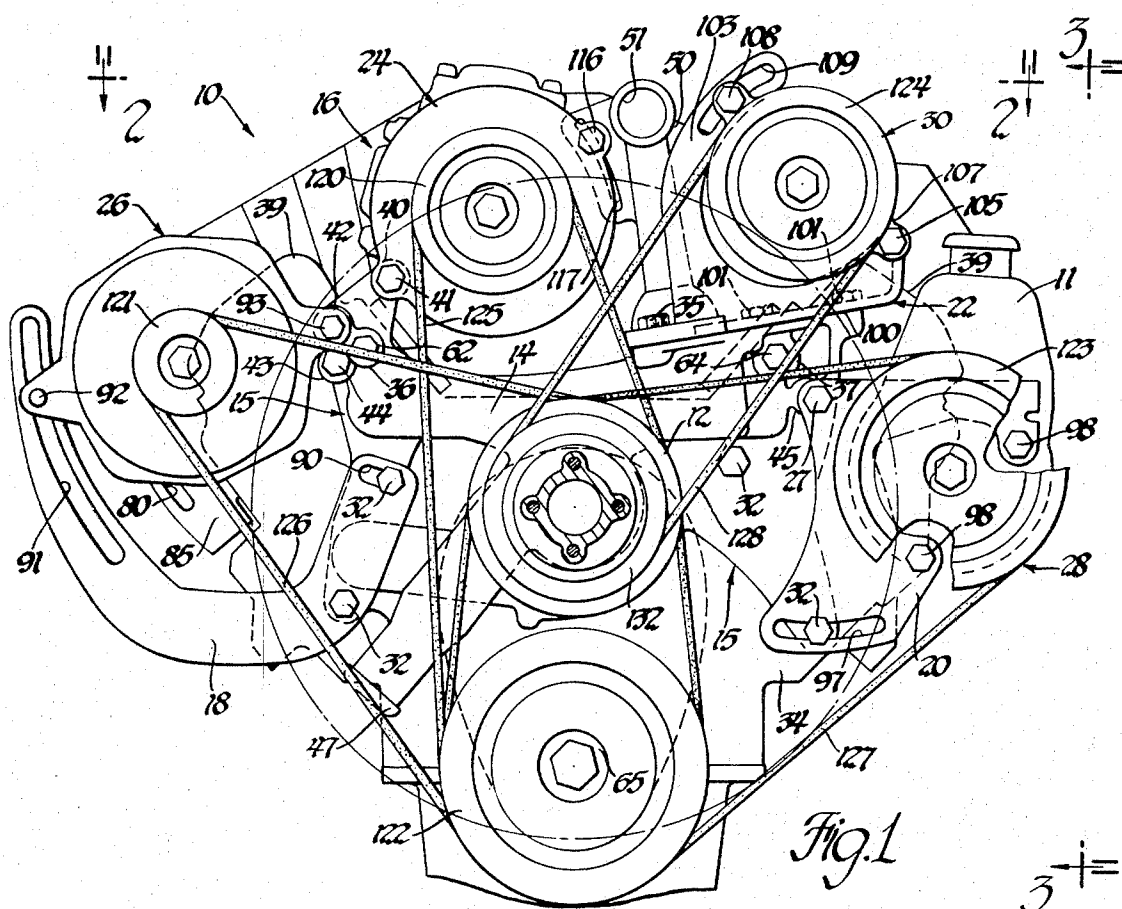
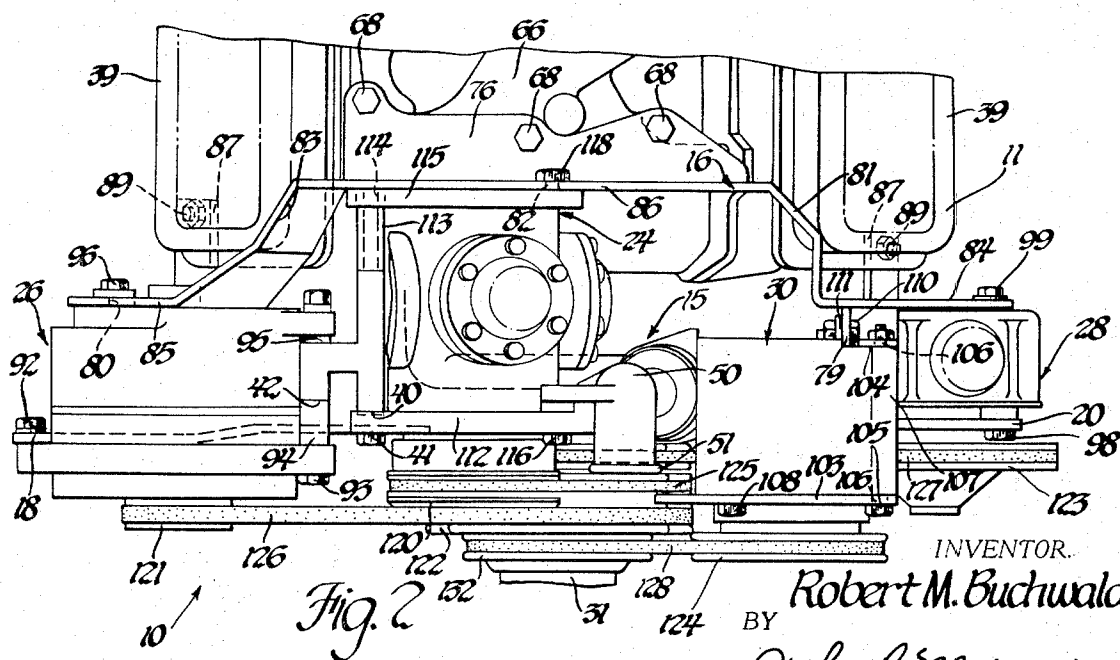
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[57] **ABSTRACT**

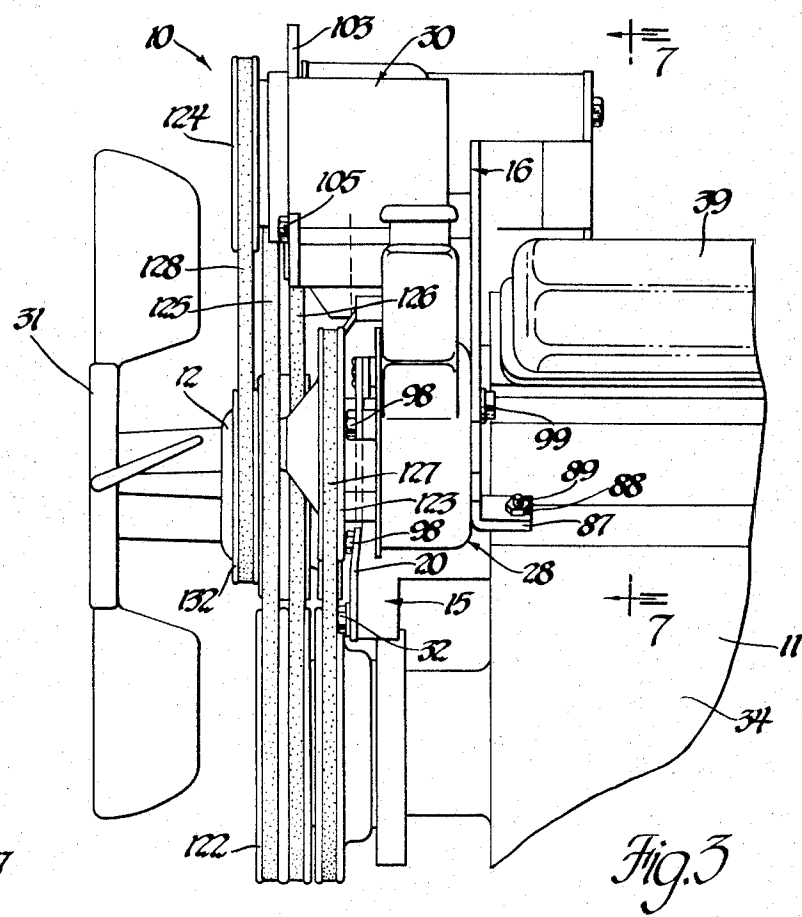
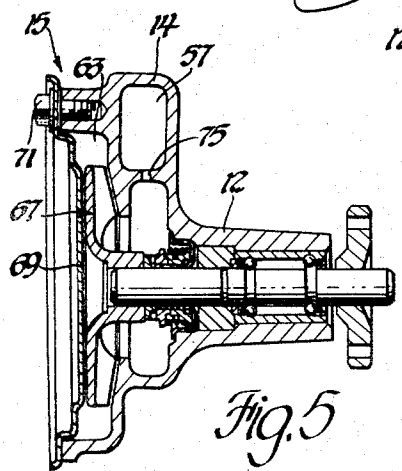
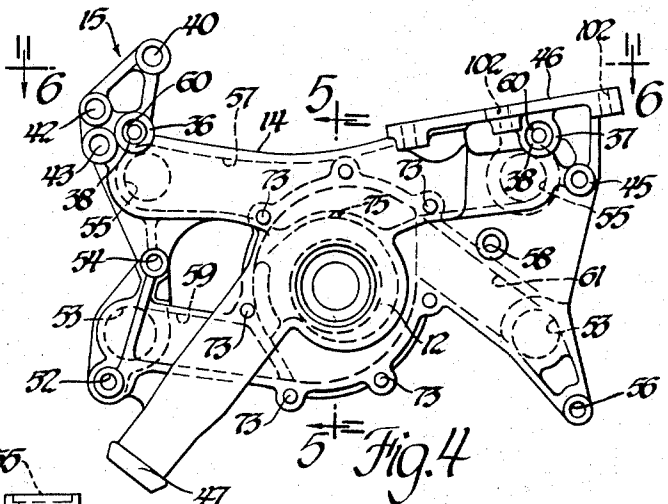
The illustrated unitized engine accessory drive arrangement includes an integral water pump body and water cross-over casting and one main selectively formed mounting bracket, the integral casting and the main bracket being cooperable with three smaller brackets to accommodate all of the conventional engine accessory units, as well as the various respective models available. Such an arrangement requires a total inventory of a substantially smaller number of brackets, belts, and related parts than is the case for current engines and their varied selection of accessory models. An alternate embodiment utilizes the above-described four mounting brackets in conjunction with a two-piece water pump body and integral water cross-over and timing belt or chain cover casting.

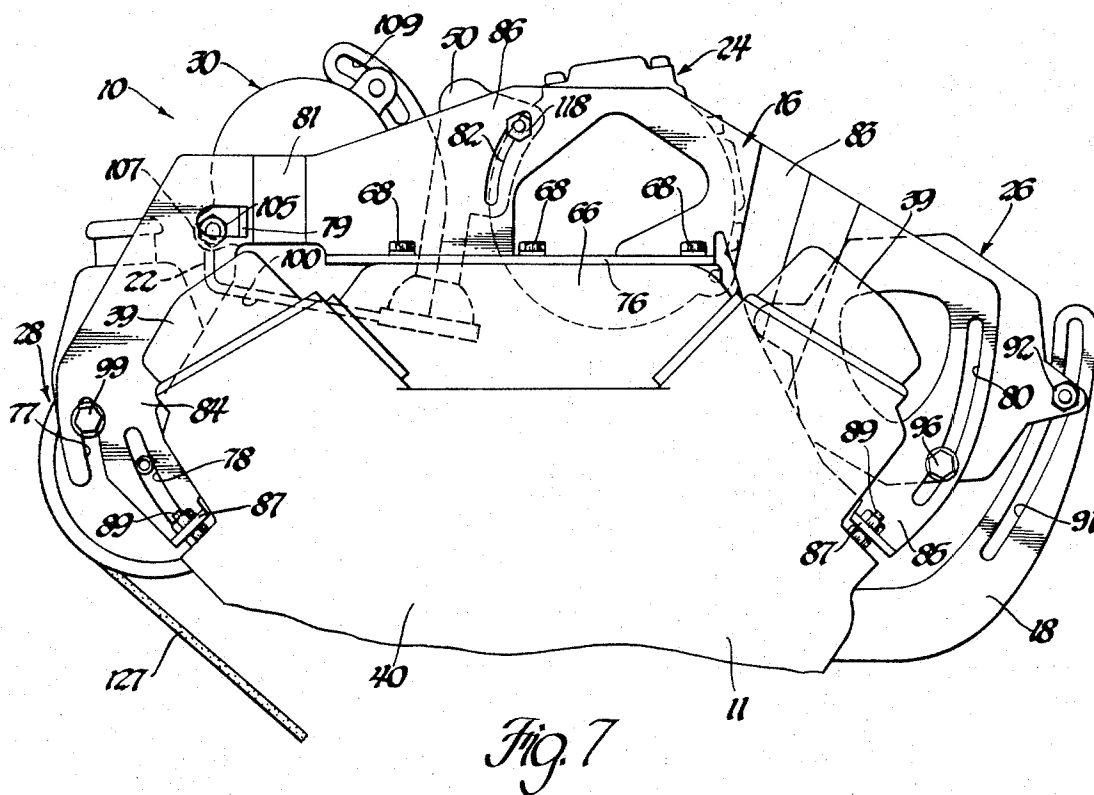
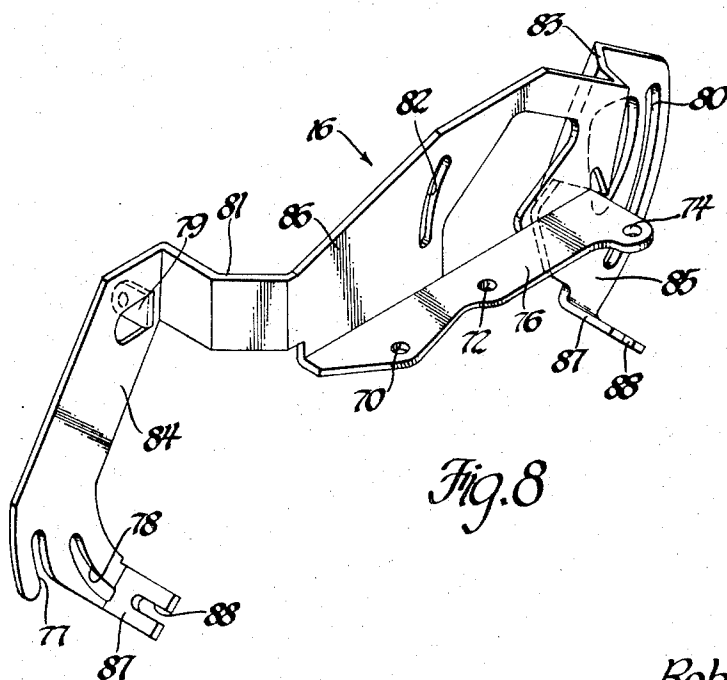
16 Claims, 12 Drawing Figures



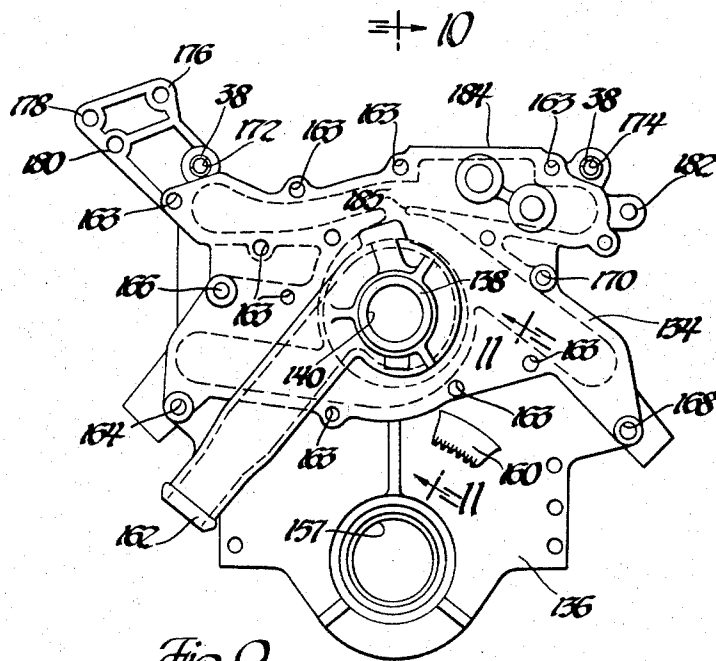
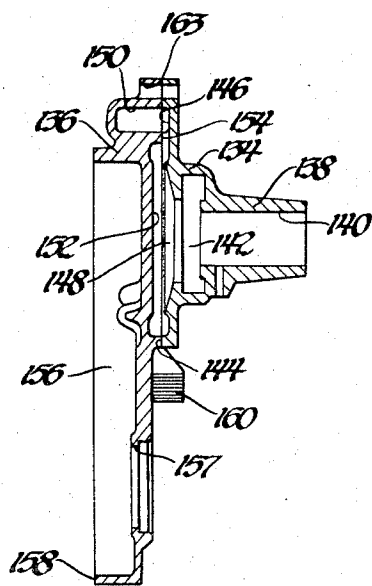
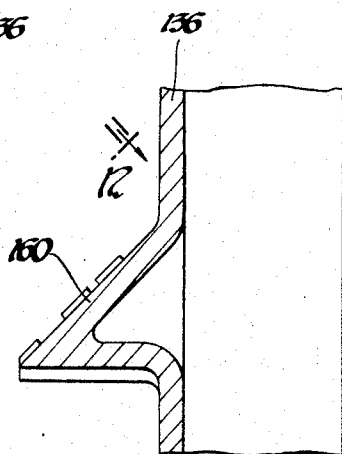
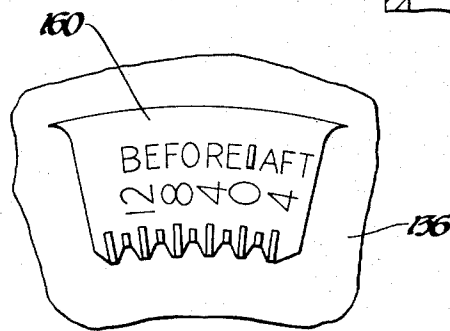


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ENGINE ACCESSORY ARRANGEMENT

This invention relates generally to engine accessories and, more particularly, to means for mounting accessory drive units in the most compact and least complicated manner.

The increased demand for additional accessories on motor vehicles has resulted in numerous additional accessory drive units being housed within the vehicle engine compartment. The present number of accessory drive units already fills the engine compartment and makes access to the engine for even routine maintenance or minor repair a difficult and time-consuming job.

Although it is customary to individually mount accessory drive units on pivotal or hinged brackets and to use belt drive means therewith, which may be more readily disconnected, the number of units and their different locations still requires considerable time in slacking off, removing and then, in reverse order, replacing and readjusting each unit separately. Additionally, the current arrangement requires an inventory of several dozens of component parts to not only individually satisfy the mounting needs for the several accessory units, but to also satisfy the mounting requirements for the various models of individual accessories.

Accordingly, an object of the invention is to provide improved means for readily mounting all of the engine accessories and any selected model of each in a simplified, compact, and unitized arrangement.

Another object of the invention is to provide improved engine accessory mounting means wherein a total of four brackets, six pulleys and four belts suffice to handle any and all possible accessory models for a particular engine.

A further object of the invention is to provide improved engine accessory mounting means wherein the largest of the above-mentioned four brackets is located above and along the sides of an integral water pump body and water cross-over casting, while the remaining three brackets are mounted in part on the integral casting, and in part on the largest bracket, the combination serving to rigidly secure all possible accessory models.

A still further object of the invention is to provide improved engine accessory mounting means wherein three mounting brackets generally similar to those discussed above, are mounted on the water pump cover portion of a two-piece mating casting, with the other portion of the casting consisting of an integrally cast water cross-over and timing chain cover.

These and other objects and advantages of the invention will become apparent when reference is made to the following description and accompanying drawings, wherein:

FIG. 1 is a plan view of the invention as viewed from the front of the vehicle;

FIG. 2 is a top view taken along the plane of line 2—2 of FIG. 1 and looking in the direction of the arrows;

FIG. 3 is a side view taken along the plane of line 3—3 of FIG. 1 and looking in the direction of the arrows;

FIG. 4 is a front view of a portion of FIG. 1;

FIG. 5 is a cross-sectional view taken along the plane of line 5—5 of FIG. 4 and looking in the direction of the arrows;

FIG. 6 is a top view taken along the plane of line 6—6 of FIG. 4 and looking in the direction of the arrows;

FIG. 7 is a view taken along the plane of line 7—7 of FIG. 3 and looking in the direction of the arrows;

FIG. 8 is a perspective view of a portion of FIG. 7;

FIG. 9 is a front view of a modification of the FIG. 4 structure;

FIG. 10 is a cross-sectional view taken along the plane of line 10—10 of FIG. 9 and looking in the direction of the arrows;

FIG. 11 is an enlarged fragmentary view taken along the plane of line 11—11 of FIG. 9 and looking in the direction of the arrows; and

FIG. 12 is a fragmentary view taken along the plane of line 12—12 of FIG. 11 and looking in the direction of the arrows.

Referring now to the drawings in greater detail, FIGS. 1—3 illustrate a unitized engine accessory drive arrangement 10 associated with the front face of an engine 11. The water pump body 12 and the water cross-over casting 14 are cast as a unit 15, as illustrated separately in FIGS. 4—6. Mounting surfaces integrally cast on the casting 15, along with a main generally inverted U-shaped bridge-support bracket 16, shown separately in FIG. 7, serve as mounting bases for three smaller brackets 18, 20, and 22, and four engine accessories 24, 26, 28, and 30, as will be explained. The total of four brackets serves to accommodate any and all combinations of the available models of the four accessories. A conventional cooling fan 31 (FIG. 3) is mounted on the front of the water pump body 12.

The casting 15 is mounted with four bolts 32 (FIG. 1) to the cylinder block, represented generally at 34. Two enlarged apertured bosses 36 and 37 (FIG. 4) accommodate adjustable sleeves 38 (FIG. 4) for mounting on the cylinder heads, represented generally at 39 (FIG. 1). The sleeves 38 are longitudinally compressed during assembly to compensate for variations in longitudinal tolerance between the respective forward planes of the block 34 and the heads 39.

The water pump and water cross-over casting 15 (FIGS. 4—6) has formed thereon an apertured boss 40 for mounting the air compressor 24 at a forward portion thereof by a bolt 41 (FIG. 1) and serving as a pivot point for rotary alignment at assembly. The casting 15 also has formed thereon a pair of apertured bosses 42 and 43, either one of which is used to mount a particular alternator 26 model at a forward portion thereof by a bolt 44 (FIG. 1), and likewise providing a pivot point for rotary alignment. The choice is made between the bosses 42 and 43 depending upon which of the three different standard alternators 26 is selected. Another apertured boss 45 serves as a pivotable mounting base for the bracket 20 with a bolt 27 for supporting the power steering pump 28 (FIG. 1), and a mounting surface 46 is formed on the upper portion of the casting 15 for mounting the bracket 22 to support the air pump 30 (FIG. 1), as will be explained.

A water inlet tubular extension 47 for receiving the water from the radiator (not shown) is cast onto the casting 15, and an outlet opening 48 and two bolt holes 49 (FIG. 6) are formed on the mounting surface 46 to facilitate the mounting thereon of a water outlet casting 50 by bolts 35 (FIG. 1) for controlling the return of the water to the radiator, the casting 50 having an upper outlet opening 51 formed therein. Intermediate the inlet extension passageway 47 and the outlet opening 48 are a pair of lower outlet openings 53 leading to the engine block 34 and two upper inlet openings 55 for receiving the water returning from the engine heads 39.

A cross-over passage or chamber 57 communicates between the inlet openings 55, while a pair of oppositely extending passages 59 and 61 communicate between the impeller chamber 63 (FIG. 5) and the respective outlet openings 53. The water pump impeller, shaft, seal, bearing, and mounting flange assembly is illustrated in place in the casting 15 in FIG. 5 and identified generally as 67. The chamber 63 is enclosed by a cover plate 69 secured to the back of the casting 15 by bolts 71 mounted in each of a plurality of mounting openings 73 (FIG. 4). A small opening 75 communicates between chambers 63 and 57 in order to communicate fluid therebetween should the thermostat (not shown) located adjacent the outlet opening 48 fail to open promptly for any reason.

The four openings which serve to accommodate the four bolts 32 for mounting the casting 15 on the engine block 34 are shown in FIG. 4 as 52, 54, 56, and 58. The mounting means which serves to connect the casting 15 to the engine heads 39 are the above-mentioned two apertured bosses 36 and 37 (FIG. 4), each of which accommodates one of the previously mentioned adjustable sleeves 38 which, due to a longitudinal split 60 formed therein, may be caused to buckle or bulge as required when respective bolts 62 and 64 (FIG. 1) are tightened therethrough, the resultant change in the length of the split sleeves 38 compensating for any variation in the position of the engine heads 39 on the engine block 34. The water pump body 12 is located directly above the usual crankshaft 65.

Referring now to FIGS. 7 and 8, there is illustrated the contoured and generally inverted U-shaped bracket 16, as viewed from the front of the engine 11 looking forward, and in perspective, respectively. The bracket 16 is located between the front face of the engine 11 and the rear portion of the accessories 24, 26, 28, and 30, as may be noted in FIG. 2, and secured to the engine manifold, represented generally at 66, by three bolts 68 (FIG. 7) through openings 70, 72, and 74 (FIG. 8) formed in a horizontally extending flange 76 formed on the bracket 16. An open slot 77 and three arcuately-slotted openings 78, 80, and 82 are formed in respective downwardly extending outer leg portions 84 and 85, and a central portion 86 in the bracket 16, and serve to accommodate mounting the rear portions of the power steering pump 28, the alternator 26, and the air compressor 24, respectively. The central portion 86 is positioned forward of the leg portions 84 and 85 by virtue of generally forwardly extending intermediate bent portions 81 and 83 (FIG. 8). A pair of laterally extending flanges 87 are formed on the ends of the leg portions 84 and 85 and have slots 88 formed therein to accommodate the mounting of the bracket 16 on studs 89 (FIG. 7) formed on the block 34. A slotted rearwardly extending vertical flange 79 is formed by punching out a portion of the leg member 84 adjacent the bent portion 81.

Referring now to the previously mentioned three smaller brackets 18, 20, and 22 (FIGS. 1 and 2), and their use in mounting the various accessories, it may be noted that the bracket 18 is secured by the bolts 32 which extend through the openings 52 and 54 (FIG. 4) in the casting 15, one of the mounting openings in the bracket 18 being an adjustment slot 90. The bracket 18 further includes an arcuate slot 91 (FIGS. 1 and 7) for

mounting a forward portion of any of the three models of alternators 26 by a bolt 92 (FIG. 2). As indicated above, the respective alternators 26 are pivotably mounted at a forward portion thereof about one of the bosses 42 and 43 of the casting 15, being secured thereto by a bolt 93 (FIGS. 1 and 2), the bolt 93 extending through sleeves or spacers 94 and 95 on opposite sides of the casting 15 and aligned with the apertured boss 42. The alternator 26 is secured at its rearward end by virtue of the bolt 93 and spacer 95 extending through an end flange formed on the alternator 26, and additionally secured to the main bracket 16 by a bolt 96 (FIGS. 2 and 7) extending through the slot 80, the latter being sufficiently wide to facilitate the mounting of the alternator 26 at its forward end on either of the bosses 42 or 43.

The bracket 20 is pivotable about the boss 45, to which it is secured by the bolt 27. An arcuate slot 97 (FIG. 1) is formed in the bracket 20 to accommodate pivotal adjustment of the bracket 20 about the upper opening 58, the bracket 20 then being secured by another of the bolts 32 mounted through the slot 97. The power steering pump 28 is secured at its forward end by two bolts 98 (FIG. 1) mounted through respective openings in the bracket 20. The power steering pump 28 is secured at its rearward end to the main bracket 16 by a bolt 99 (FIGS. 2 and 7) extending through the open slot 77. A tube, shown in FIG. 7, formed on the end face of the power steering pump 28 extends through the arcuate slot 78 which provides clearance therefor.

The air pump bracket 22 includes a bottom surface 100 (FIG. 1) which is mounted on the surface 46 (FIGS. 1 and 4) of the casting 15 by three bolts 101 (FIG. 1) mounted in respective threaded openings 102 (FIG. 6) formed in the surface 46. The bracket 22 further includes an arcuate-shaped forward wall 103 (FIGS. 1 and 2) and a partial rear wall or vertical flange 104 (FIG. 2). The air pump 30 is secured by a bolt 105 mounted through aligned openings 106 (FIG. 2) formed in the respective forward and rear walls 103 and 104 of the bracket 22 and through an apertured mounting boss 107 (FIGS. 1 and 2) formed on the air pump 30. The air pump 30 is further secured at its forward end by a bolt 108 (FIG. 1) mounted through an arcuate slot 109 formed in the upper portion of the forward wall 103. The air pump 30 is also further secured at its rearward end by a bolt 110 (FIG. 2) mounted through the slotted vertical flange 79 (FIG. 8) formed on the punched out portion of leg 84 on the main bracket 16 and through a flange 111 (FIG. 2) formed on the air pump 30.

The air compressor 24, as indicated above, is mounted at its forward end by the bolt 41 (FIG. 1) on the apertured boss 40 (FIG. 4) which serves as a pivot point therefor. More specifically, the bolt 41 extends through a forward flange 112 (FIG. 2) of the air compressor 24 and then through the apertured boss 40 into an internally threaded sleeve 113 slidably mounted in an aligned opening 114 formed in a rear flange 115 of the air compressor 24. The air compressor 24 is further secured at its forward end by a bolt 116 mounted through both the flange 112 and an arcuate opening 117 (FIG. 1) formed in the water outlet casting 50. The compressor 24 is secured at its rearward end by a bolt

118 (FIG. 2) mounted through the arcuate opening 82 (FIG. 8) of the central portion 86 of the main bracket 16, and thence threadedly secured to the rear flange 115.

FIGS. 9-12 illustrate a modification of the integral water pump body and water cross-over casting 15 of FIGS. 4-6. More specifically, in lieu of the integral casting 15, two front and rear mating castings 134 and 136, respectively, (FIG. 10) are utilized. The front casting 134 is cast iron, while the rear casting 136 may be either die cast or sand cast aluminum. The front casting 134 includes an extended portion 138 having a passage 140 and a chamber 142 formed therein suitable for the mounting therein of the usual water pump bearing and seal (not shown). The back side and mating surface 144 of the casting 134 is cored out so as to form chambers 146 and 148. Adjacent chambers 150 and 152 are formed in the front side and mating surface 154 of the rear casting 136, the complete chamber 146/150 serving as the water cross-over passage, comparable to the passage 57 of the casting 15 (FIG. 3), while the complete chamber 148/152 houses the usual water pump impeller (not shown) when the surfaces 144 and 154 are in contact with each other, comparable to the chamber 63 enclosed by the cover member 69 and illustrated in FIG. 5.

As seen in FIG. 10, a large chamber 156 is formed on the side of the rear casting 136 opposite the mating surface 154. The chamber 156 is suitable for the mounting therein of the usual timing chain (not shown). A crankshaft opening 157 is formed through a wall of the rear casting 136 below the front casting 134, communicating with the timing chain chamber 156. The surface 158 therearound is mountable on the engine block 34 and the oil pan (not shown). A timing indicator 160 (FIG. 12) is integrally cast (FIG. 10) on an outer surface of the casting 136, also below the front casting 134. A water inlet 162 (FIG. 9) is cast on the casting 134. The castings 134 and 136 are secured together by fasteners (not shown) mounted in a plurality of aligned openings 163.

As is the case with openings 52, 54, 56, and 58 of the FIGS. 4-6 casting structure 15, openings 164, 166, 168, and 170 serve to mount the castings 134 and 136 on the cylinder block 34. A pair of openings 172 and 174 serve to mount the casting 136 on the heads 39. As with the casting 15, sleeves 38 are mounted in the openings 172 and 174 to compensate for length variations between the heads 39 and the block 34. Mounting bosses 176, 178, 180, and 182 are cast on the front face of the casting 134, and a mounting surface 184 is cast on the top thereof, suitable for the mounting thereon of the various engine accessories 24, 26, 28, and 30 in the manner discussed above relative to the respective bosses 40, 42, 43, and 45, and top surface 46 of FIG. 4, the respective positions of the accessories being substantially similar to the positions illustrated in FIGS. 1 or 7. An opening 185 formed in the casting 134 corresponds to the opening 75 formed in the casting 15. A cooperating main bracket would be substantially similar to the bracket 16 of FIG. 8, with some relatively minor repositioning of mounting holes, etc., to cooperate with the mounting provisions of the castings 134 and 136.

It is apparent that a total of only four brackets 16, 18, 20, and 22 are used in conjunction with the integral water pump body and water cross-over casting 15, or with the two-piece water pump body and integral water cross-over and timing chain cover casting 134/136, to furnish support for some one of the three alternator models 26, the air-conditioning compressor 24, the air pump 30, and the power steering pump 28. If power steering is not involved, three brackets 16, 18, and 22 will suffice. A total of four driven pulleys 120, 121, 123, and 124 and four belts 125, 126, 127, and 128, respectively serve to accommodate all of the accessories 24, 26, 28, and 30, respectively with a pulley 132 and a portion of the belts 126 and 127 serving to rotate the cooling fan 31 (FIG. 1). A drive pulley 122 is mounted on the crankshaft 65 for driving the other pulleys 120, 121, 123, 124, and 132.

In contrast, the conventional engine requires an inventory of a substantially larger number of pulleys, belts, brackets and related items to accommodate the various engine accessory combinations. Hence, the unitized engine accessory drive arrangement 10 provides a very substantial savings in parts, as compared to the conventional engine accessory arrangement, as well as resulting in a corresponding appreciable savings in weight.

While but one general embodiment and two subassembly embodiments have been shown and described, other modifications thereof are possible.

I claim:

1. A unitary casting for mounting on the cylinder block of a vehicle engine and cooperable with a radiator, said unitary casting comprising a water pump housing including a chamber and a central passage axially aligned with said chamber, said chamber and central passage being suitable for the rotatable mounting therein of a water pump impeller, shaft and bearing, a first inlet formed on said casting suitable for connection with said radiator and communicating fluid from said radiator to said chamber, a pair of oppositely disposed outlets formed on said casting, a pair of passages formed in said casting communicating between said chamber and said respective oppositely disposed outlets, said outlets being suitable for connection with said cylinder block and communicating said fluid from said chamber to said cylinder block, a water cross-over passage formed in said casting, a common wall formed between said water cross-over passage and said chamber, a pair of inlets formed in said casting adjacent opposite ends of said water cross-over passage suitable for connection with said engine and communicating said fluid from said engine to said water cross-over passage, and an outlet formed on said casting in communication with said water cross-over passage and suitable for connection with said radiator to communicate said fluid from said water cross-over passage to said radiator.

2. The unitary casting described in claim 1, and a main bridge-support bracket mounted on said engine and having a central section located above said casting, and leg sections extending downwardly from said central section along opposite ends of said casting, a plurality of mounting bosses formed on a face of said casting, said main bridge-support bracket and said mounting bosses providing respective rear and forward mounting bases for all accessories for said engine.

3. The unitary casting described in claim 2, and provisions formed on said main bridge-support bracket for directly adjustably mounting one end of each of said accessories, a portion of said accessories being directly adjustably mounted at their other ends on said respective mounting bosses.

4. The unitary casting described in claim 3, and additional bracket means pivotally mounted on said respective mounting bosses for adjustably mounting said other end of any of a plurality of models of at least one of said accessories.

5. For use with a vehicle engine, a mounting arrangement for a plurality of models of an engine accessory having pivot apertures and front and rear mounting apertures at different distances with respect to the center of said engine, said arrangement comprising first and second mounting members secured to said engine, a plurality of mounting bosses formed on said first member, an arcuate slot formed on said second member, a mounting bracket having an arcuate slot formed adjacent one end thereof, a transverse slot formed adjacent the other end thereof, an opening formed at an intermediate point thereon, a first fastener for pivotally mounting said bracket on one of said mounting bosses at said opening, a second fastener for securing said bracket to a second of said mounting bosses at said transverse slot, a third fastener for pivotally securing one end of any one of said plurality of models of an engine accessory at said front mounting aperture thereof to one of two other of said plurality of mounting bosses, a fourth fastener for securing said one end of said any one of said plurality of models of an engine accessory at said pivot aperture thereof to said pivotally mounted bracket at said arcuate slot thereof, and a fifth fastener for securing the other end of said any one of said plurality of models of an engine accessory at said rear mounting aperture thereof to said second mounting member at said arcuate slot thereof.

6. Accessory mounting means for use with the accessories of a vehicle engine, said mounting means including an engine cooling water flow-control casting and a plurality of mounting brackets, a water pump assembly operatively mounted in said casting, said casting and said mounting brackets serving to support all of said engine accessories, one of said brackets being a main support bracket for pivotally securing one end of each of said accessories, the other three brackets being secured to said casting to respectively support the other ends of respective engine accessories.

7. The mounting means described in claim 6, wherein two of said other three brackets include means for pivotally mounting said two brackets on said casting and for adjustably mounting two of said accessories, and said third of said other three brackets includes means for adjustably mounting a third of said accessories.

8. The mounting means described in claim 7, and a water outlet casting mounted on said water flow-control casting, said water outlet casting including mounting means for adjustably mounting the fourth engine accessory.

9. The mounting means described in claim 6, wherein two of said other three brackets include means for pivotally mounting said two brackets on said casting and for adjustably mounting a power steering pump and any one of a plurality of alternators, and said third

of said other three brackets includes means for adjustably mounting an air pump.

10. The mounting means described in claim 9, and a water outlet casting mounted on said water flow-control casting, said water outlet casting including mounting means for adjustably mounting an air conditioner.

11. Accessory mounting means for use with the accessories of a vehicle engine, said mounting means including an integral water pump body and water cross-over casting mounted on the front face of said engine, a plurality of mounting bosses formed on the exposed face of said casting, a main bridge-support bracket mounted on said engine above and along both sides of said casting, first and second contoured brackets pivotally mounted on said mounting bosses of said casting adjacent respective oppositely disposed surfaces of said bridge-support bracket, an upper mounting surface formed on said casting, a third contoured bracket mounted on a portion of said upper mounting surface and on said main bridge-support bracket adjacent one of said oppositely disposed surfaces, and a water outlet casting mounted on another portion of said upper mounting surface.

12. The mounting means described in claim 11, and an alternator mounted intermediate said first contoured bracket and one of said oppositely disposed surfaces of said main bridge-support bracket, an air-conditioning compressor mounted in part on said water outlet and integral water pump body and water cross-over castings and in part on said main bridge-support bracket, an air pump mounted on said third contoured bracket, and a power steering pump mounted intermediate said second contoured bracket and the other of said oppositely disposed surfaces of said main bridge-support bracket.

13. Accessory mounting means for use with the accessories of a vehicle engine, said mounting means including an integral water pump body and water cross-over casting mounted on the front face of said engine, a plurality of mounting bosses formed on the exposed face of said casting, a main bracket mounted on said engine above and along both sides of said casting, said main bracket including a central portion, first and second generally forwardly extending portions secured to the side edges of said central portion, first and second leg portions extending outwardly and downwardly from the respective forward edge of said first and second forwardly extending portions, an arcuate slot formed in each of said central and leg portions, first and second arcuate-shaped brackets pivotally mounted on said mounting bosses of said casting adjacent said respective first and second leg portions of said main bracket, an upper mounting surface formed on said casting, a bracket having a bottom surface and at least one side surface with said bottom surface being mounted on said upper mounting surface, and a laterally extending flange portion formed on the bottom edge of said central portion of said main bracket for mounting said main bracket on said engine.

14. A unitized engine accessory drive arrangement for use with a vehicle engine, said arrangement including an integral water pump body and water cross-over casting mounted on the front face of said engine, a water outlet casting mounted on said integral casting, a plurality of mounting bosses formed on the exposed

face of said integral casting, a main support bracket mounted on said engine above and having leg portions extending downwardly along both sides of said integral casting, first and second arcuate-shaped brackets pivotally mounted on said mounting bosses of said integral casting adjacent said respective downwardly extending leg portions of said main support bracket, an upper mounting surface formed on said integral casting, a channel-shaped bracket mounted on said upper mounting surface and spaced apart a predetermined distance from said main support bracket on the side opposite said engine, an air-conditioning compressor secured at one end thereof to said water outlet casting and to one of said mounting bosses of said integral casting and at the other end thereof to said main support bracket, an air pump secured at one end thereof to said channel-shaped bracket and at the other end thereof to said main support bracket, any of a plurality of alternator models adjustably secured at one end thereof to one of two of said mounting bosses on said integral casting and to said first pivotally mounted arcuate-shaped bracket and at the other end to one of said downwardly extending leg portions of said main support bracket, and a power steering pump secured at one end thereof to said second arcuate-shaped bracket and at the other end to the other of said downwardly extending leg portions of said main support bracket.

15. Accessory mounting means for use with the accessories of a vehicle engine, said mounting means including a two-piece water pump body, water cross-over and timing device cover casting mounted on the front face of said engine, a plurality of mounting bosses formed on the exposed face of said two-piece casting, a main support bracket mounted on said engine adjacent said two-piece casting, a laterally extending flange formed on a central portion of said main support bracket for mounting on said engine, said main support bracket including a vertical central portion and oppositely disposed downwardly extending outer leg portions on a different plane from that of said vertical central portion, first and second arcuate brackets pivotally mounted on said mounting bosses of said two-piece casting adjacent said respective outer leg portions of said main support bracket, an upper mounting surface

formed on at least one part of said two-piece casting, a third bracket mounted on a first portion of said upper mounting surface adjacent said main support bracket, and a water outlet casting mounted on a second portion of said upper mounting surface.

16. A unitized engine accessory drive arrangement for use with a vehicle engine, said arrangement including a two-piece casting, the mating surfaces thereof forming water pump and water cross-over chambers, a chamber formed in one of said two-piece casting for the mounting therein of an engine timing chain, a timing indicator cast on an outer surface of said one of said two-piece casting, said timing chain chamber being mounted on the front face of said engine, a water outlet casting mounted on said two-piece casting and communicating with said water cross-over chamber, a plurality of mounting bosses formed on the exposed face of the other of said two-piece casting, a main bridge-support bracket mounted on said engine with a central portion above and side portions extending downwardly along both sides of said two-piece casting, first and second arcuate-shaped brackets pivotally mounted on said one of said two-piece casting adjacent said respective downwardly extending side portions of said main bridge-support bracket, an upper mounting surface formed on said two-piece casting, a channel-shaped bracket mounted on said upper mounting surface adjacent one of said downwardly extending side portions of said main bridge-support bracket, an air-conditioning compressor secured at one end thereof to said water outlet casting and to said one of said two-piece casting and at the other end thereof to said main bridge-support bracket, an air pump secured at one end thereof to said channel-shaped bracket and at the other end to one of said downwardly extending side portions, an alternator secured at one end thereof to said one of said two-piece casting and to said first arcuate-shaped bracket and at the other end to the other of said downwardly extending side portions of said main bridge-support bracket, and a power steering pump secured at one end thereof to said second arcuate-shaped bracket and at the other end to said one of said downwardly extending side portions of said main bridge-support bracket.

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