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AT SEATTLE
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 WESTERN DISTRICT OF WASHINGTON
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03-CV-01268-CMP

UNITED STATES DISTRICT COURT
 WESTERN DISTRICT OF WASHINGTON
 AT SEATTLE

KERRY D. LEARNED, an individual; and
 LOM INDUSTRIES, INC., a Washington
 corporation

Plaintiffs,

v.

BAUM TOOLS UNLIMITED INC., a Florida
 corporation,

Defendant.

C03-1268C
 COMPLAINT FOR PATENT
 INFRINGEMENT, TRADEMARK
 INFRINGEMENT, FALSE
 ADVERTISING AND UNFAIR
 COMPETITION

DEMAND FOR JURY TRIAL

Plaintiffs Kerry D. Learned and LOM Industries, Inc., for their Complaint against
 defendant Baum Tools Unlimited, Inc. ("Baum Tools"), alleges as follows:

NATURE OF THE ACTION

1. This is a action including claims for patent and trademark infringement, false
 advertising and torts arising out of defendant's importing, making, using, advertising, selling
 and/or offering to sell a device branded and marketed as the "Multi-Lock II Cam Locks"
 and/or as the "B-4500 Universal Twin/4 Cam Lock." Defendant's commercial and
 advertising activities infringe a United States patent issued to plaintiff Kerry Learned entitled
 "Double Overhead Camshaft Alignment Method," U.S. Patent No. 5,755,029, and infringe the
 CAM-LOK trademark owned by plaintiffs.

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THE PARTIES

2. Plaintiff D. Learned ("Learned") is an individual residing in Skagit County, Washington. Learned is the inventor and owner of U.S. Patent No. 5,755,029, "Double Overhead Camshaft Alignment Method" (hereinafter the "'029 patent").

3. Plaintiff LOM Industries, Inc. ("LOM") is a Washington corporation with its principal place of business in Auburn, Washington. LOM is the owner of the CAM-LOK mark used for a timing belt removal tool and method described and claimed in the '029 patent. The CAM-LOK mark is the subject of a pending United State trademark registration application, U.S. Trademark Application Serial No. 75/921,497. LOM is a licensee with respect to '029 patent rights and is the manufacturer of the CAM-LOK Multi Camshaft Alignment Tool.

4. Defendant Baum Tools Unlimited, Inc. ("Baum Tools") is a Florida corporation, with its principal place of business, upon information and belief, in Sarasota, Florida.

JURISDICTION AND VENUE

5. This action is based on the patent laws of the United States, 35 U.S.C. § 1 *et seq.*, the Lanham Act, 15 U.S.C. § 1051 *et seq.*, and state statutory law and related common law torts.

6. This Court has subject matter jurisdiction pursuant to 15 U.S.C. § 1121, 28 U.S.C. §§ 1131, 1332 and 1338, as well as 28 U.S.C. § 1367(a), allowing supplemental jurisdiction over related state-law claims.

7. Venue is proper in Western District of Washington pursuant to 28 U.S.C. § 1391, *et seq.* Defendant has sold and is advertising and selling infringing products in this district, a substantial part of the events giving rise to the claims occurred in this district, and a substantial injury to plaintiffs' property that is the subject of this action occurs in this district.

PLAINTIFFS AND THEIR RIGHTS

8. Plaintiff Kerry Learned is an ASE ("Automotive Service Excellence") certified master technician. In the course of servicing and repairing internal combustion engines, Learned perfected and invented a method and apparatus for maintaining the timing position of double overhead camshafts during the replacement or reinstallation of a toothed, timing belt. The timing belt replacement procedure invented by Learned solved a difficult repair and installation task facing automobile technicians working with double overhead camshaft engines that have largely replaced prior technology automotive engines.

9. On May 26, 1998, the United States Patent and Trademark Office ("USPTO") issued United States Patent No. 5,755,029 entitled "*Double Overhead Camshaft Alignment Method*," a copy of which is attached hereto.

10. Learned is a principal of LOM, which has a license to use and employ the '029 patent rights and manufactures and sells the CAM-LOK Multi Camshaft Alignment Tool. LOM is the owner of the CAM-LOK mark, which was first used in commerce on October 14, 1999, for a hand-operated alignment tool that holds camshafts in a fixed position while the timing belt is being replaced. Plaintiffs expect this mark will soon be federally registered. LOM has continually used, and is using, the CAM-LOK mark in interstate commerce in connection with the sale and marketing of its multi camshaft alignment tools.

DEFENDANT AND ITS UNLAWFUL AND TORTIOUS ACTIVITIES

11. Defendant Baum Tools is a nationwide importer, manufacturer and distributor of specialty automotive tools. Baum Tools represents itself to the public as having the most comprehensive stock of specialty automotive tools in the United States. Baum Tools sells and distributes a device that it advertises, brands and markets as *Multi-Lock II Cam Locks*, its shorthand name for a twin and quad cam sprocket locking tool, and also as the *B-4500 Universal Twin/4 Cam Lock* (hereinafter, both are referred to collectively as the "Baum

1 device"). Baum Tools has appeared at trade shows in the State of Washington and elsewhere
2 to promote its specialty automotive tools, including the Baum device.

3 12. Upon information and belief, Baum Tools first began representing to the
4 purchasing public in late 2000/early 2001 that its twin and quad cam sprocket-locking tool
5 device was the subject of a pending United States patent. Since 2002, Baum Tool's marketing
6 and advertising touted and represented to the purchasing public that the Baum device is
7 patented. Baum Tools' patent reference is to U.S. Patent No. 6,332,256, issued on December
8 25, 2001 (the '256 patent). According to the '256 patent, the invention has been devised for
9 the purpose of assisting automotive service technicians in replacing timing belts for double
10 overhead camshaft engines. As Baum Tools knew or should have known, the grant of a
11 patent on an improvement of a patented article or method does not excuse infringement of the
12 dominant patent and that an unlicensed improver of a product or method is an infringer of a
13 dominant patent. Therefore, in addition to actual notice of that its device infringed the '029
14 patent, Baum Tools and its agents knew or should have known that the Baum device would be
15 used in a manner that would infringe the '029 patented method for replacing timing belts on
16 double overhead camshaft engines.

17 13. Baum Tools misrepresented and failed to state or explain in connection with its
18 advertising representations and promotions regarding the patented status of the Baum device
19 that: (a) the Baum '256 patent cited the '029 patent reference as dominant prior art and that
20 the later patented Baum device cannot be employed by the purchaser/user in its expected
21 manner and for its intended purpose without infringing the dominant '029 patent; and (b)
22 Baum Tools has not entered into any licensing agreement with plaintiffs to allow the non-
23 infringing use of the Baum device for its intended purpose.

24 Baum Tools further knew or should have known that professional trade magazines and
25 publications advertising specialty automotive tools would often advertise and promote the
26 Baum device in the same publication—sometimes even on the same page—as plaintiff's

1 CAM-LOK device. Therefore, Baum knew or should have known that its false or misleading
2 representations regarding the "patented" status of the Baum device would mislead the
3 intended purchaser/user into believing that: (a) the Baum device could be used and employed
4 without infringing the dominant '029 patent; and that (b) the Baum device was identified as a
5 *Cam Lock* device, without regard to plaintiff's prior use of the coined mark in interstate
6 commerce.

7 14. LOM has been marketing and distributing its CAM-LOK device in interstate
8 commerce since October 1999, well before Baum Tools' first use of its confusingly similar
9 CAM LOCKS mark in connection with the Baum device. Baum Tools knew or should have
10 known of LOM's use of the CAM-LOK mark, especially since the respective parties advertise
11 and promote their products in many of the same professional trade publications. As a result of
12 defendant's trademark infringement, plaintiffs are receiving misdirected telephone calls and
13 inquiries concerning the Baum device, which confused callers assume is being manufactured
14 and sold or is somehow affiliated with their company and CAM-LOK device.

15 **FIRST CLAIM: PATENT INFRINGEMENT**

16 15. Plaintiff Learned realleges and incorporates by reference the allegations set
17 forth in paragraphs 1 through 14 of this Complaint.

18 16. On information and belief, defendant has been, and is, infringing—directly,
19 contributorily and/or by inducement—one or more claims of the '029 patent by importing,
20 manufacturing, using, selling and/or offering for sale its Baum device in the United States and
21 in this judicial district.

22 17. Upon information and belief, defendant had actual notice of plaintiffs' rights
23 with respect to '029 patent, but continued to infringe the '029 patent after receipt of such
24 notice.

25 18. Upon information and belief, defendant's infringement of the '029 patent has
26 been willful.

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1 19. Plaintiff Learned has been, and will continue to be, damaged by such
2 infringement in a manner and an amount that cannot be fully measured or compensated in
3 economic terms and for which there is no adequate remedy at law. The patent infringement
4 conduct of defendant has damaged, and will continue to damage plaintiffs' business, market,
5 reputation, and good will unless the patent infringement acts complained of are enjoined in
6 this action.

7 20. Plaintiff Learned has been has been damaged by defendant's patent
8 infringement in an amount to be proven at trial.

9 **SECOND CLAIM: TRADEMARK INFRINGEMENT**

10 21. Plaintiff LOM Industries realleges and incorporates by reference the
11 allegations set forth in paragraphs 1 through 20 of this Complaint.

12 22. Defendant has used, and is continuing to use, promote, market and sell its
13 Baum device with the infringing "Cam Locks" or "Cam Lock" mark in interstate commerce
14 in the United States and the state of Washington. Further, defendant is inducing others to
15 infringe and/or failing to prevent others from infringing the CAM-LOK mark in advertising
16 and other marketing and promotional materials that defendant has sponsored and/or endorsed
17 either explicitly or implicitly.

18 23. Defendant's use of the "Cam Locks" or "Cam Lock" mark constitutes a false
19 and misleading designation of origin that is actually causing and is likely to continue causing
20 confusion, mistakes and/or deception of others, as to the origin, sponsorship, affiliation,
21 connection or approval of plaintiff's CAM-LOK Multi Camshaft Alignment Tool in
22 relationship to defendant's infringing Baum device and vice versa. Such false and misleading
23 designations of origin constitute an infringement of plaintiff's rights in the CAM-LOK mark
24 in violation of the Lanham Act, 15 U.S.C. § 1125(a).

1 24. Defendant knew, or should have known, of plaintiff's rights, and defendant's
2 trademark infringement was knowing, willful and deliberate, making this an exceptional case
3 within the meaning of 15 U.S.C. § 1117.

4 25. Plaintiff LOM Industries has been, and will continue to be, damaged by
5 defendant's trademark infringement in a manner and an amount that cannot be fully measured
6 or compensated in economic terms. Defendant's actions have damaged, and will continue to
7 damage, plaintiffs' property, market, reputation, and goodwill, and may discourage current
8 and potential customers from dealing with plaintiffs. Such irreparable harm will continue
9 unless defendant's acts are enjoined in this action.

10 26. Plaintiff LOM Industries has been damaged by defendant's trademark
11 infringement in an amount to be proven at trial.

12 **THIRD CLAIM: FALSE ADVERTISING**

13 27. Plaintiffs reallege and incorporate by reference the allegations set forth in
14 paragraphs 1 through 26 of this Complaint.

15 28. Defendant's labeling of the Baum device and its advertising and promotional
16 explanations of the patented status of the Baum device constitute misleading descriptions of
17 fact and/or misleading representations of facts regarding the alleged patented nature,
18 characteristics and qualities of the defendant's Baum device. Such misleading descriptions of
19 fact and/or representations of facts constitute unfair competition and violate plaintiffs' rights
20 under of the Lanham Act, 15 U.S.C. § 1125(a).

21 29. Defendant knew, or should have known, of plaintiffs' rights, and defendant's
22 misleading descriptions and representations regarding the alleged patented status of its Baum
23 device was knowing, willful and deliberate, making this an exceptional case within the
24 meaning of 15 U.S.C. § 1117.

25 30. Plaintiffs have been, and will continue to be, damage by defendant's
26 misleading representations regarding the patented status of its Baum device in a manner and

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1 an amount that cannot be fully measured or compensated in economic terms. Defendant's
 2 actions have damaged, and will continue to damage, plaintiffs' property, market, reputation,
 3 and goodwill, and may discourage current and potential customers from dealing with
 4 plaintiffs. Such irreparable harm will continue unless defendant's acts are enjoined in this
 5 action.

6 31. Plaintiffs have been damaged by defendant's misleading advertising in an
 7 amount to be proven at trial.

8 **FOURTH CLAIM: STATE LAW CLAIMS**

9 32. Plaintiffs reallege and incorporate by reference the allegations set forth in
 10 paragraphs 1 through 31 of this Complaint.

11 33. Defendant's improper use of plaintiffs' CAM-LOK mark and its false or
 12 misleading representations regarding the patented status of the Baum device constitute unfair
 13 competition and unfair or deceptive acts or business practices in violation of state statutory
 14 and common law.

15 34. Plaintiffs have been and will continue to be irreparably injured by reason of
 16 defendant's unfair and wrongful conduct violating state statutes and common law. Such
 17 irreparable injury will continue unless defendant's acts are enjoined in this action.

18 35. Plaintiffs and their property have been damaged by defendant's unfair and
 19 wrongful conduct in an amount to be proven at trial.

20 **PRAYER FOR RELIEF**

21 WHEREFORE, plaintiffs respectfully pray for judgment against defendant as follows:

22 1. That defendant and its officers, employees, agents and distributors, and all
 23 other persons in active concert or participation with any of them, be enjoined and restrained
 24 during the pendency of this action and permanently thereafter from infringing '029 patent
 25 rights;
 26

1 2. That defendant be required to pay plaintiffs such damages as they have
2 sustained, or will sustain, as a result or consequence of defendant's patent infringement,
3 including lost profits, but in no event less than a reasonable royalty, as provided in 35 U.S.C.
4 § 284.

5 3. That defendant's infringement of the '029 patent be found to have been
6 willfully committed by defendant, that this case be found "exceptional," and that the damages
7 be increased to three times the amount assessed, as provided by 35 U.S.C. § 284;

8 4. That defendant be ordered to pay plaintiffs the costs of this action and its
9 reasonable attorneys' fees, and interest, as provided by 35 U.S.C. §§ 284 and 285.

10 5. That defendant and its officers, employees, agents and distributors, and all
11 other persons in active concert or participation with any of them, be enjoined and restrained
12 during the pendency of this action and permanently thereafter from using the CAM-LOK
13 mark or designation or any confusingly similar mark or designation, including, but not limited
14 to "Cam Locks," in connection with the marketing or sale of the Baum device or its
15 substantial equivalents.

16 6. That defendant and its officers, employees, agents and distributors, and all
17 other persons in active concert or participation with any of them, be enjoined and restrained
18 during the pendency of this action and permanently thereafter from all acts of false
19 designations of origin, all false or misleading descriptions or representations facts and all acts
20 of unfair competition and unfair business practices in connection with their marketing,
21 promotion and sale of the Baum device or its substantial equivalents;

22 7. That defendant be required to pay plaintiffs such damages as plaintiffs have
23 sustained, and will sustain, as a result or consequence of defendant's trademark infringement,
24 false advertising and unfair competition, and to account for all gains, profits, and advantages
25 derived by defendant that are attributable to such unlawful acts; and that such damages be
26 trebled as provided by 15 U.S.C. § 1117 and statutory and common law;

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1 8. That the Court adjudge this to be an exceptional case and require defendant to
2 pay plaintiffs the cost of this action, including reasonable attorneys' fees and interest as
3 provided by 15 U.S.C. § 1116 and statutory and common law;

4 9. That defendant be ordered to pay plaintiffs prejudgment interest and post
5 judgment interest on all sums allowed by law;

6 10. That this Court order that all infringing promotional materials, products, and
7 other materials of defendant or in the possession of defendant that are likely to cause
8 confusion, mistake or deception be delivered to plaintiffs and destroyed pursuant to 15 U.S.C.
9 § 1118; and

10 11. That plaintiffs be awarded such other and further relief as the Court may deem
11 just and equitable.

12 **DEMAND FOR JURY TRIAL**

13 Plaintiffs demand a trial by jury as to all issues so triable

14
15 DATED this 10th day of June, 2003.

16 LANE POWELL SPEARS LUBERSKY LLP

17 By Paul Swanson
18 David T. Hunter, WSBA No. 12685
19 Paul D. Swanson, WSBA No. 13656
20 Attorneys for Plaintiffs

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26 COMPLAINT - 10

US005755029A

United States Patent [19]

Learned

[11] Patent Number: **5,755,029**[45] Date of Patent: **May 26, 1998**[54] **DOUBLE OVERHEAD CAMSHAFT
ALIGNMENT METHOD**[76] Inventor: **Kerry D. Learned**, 4003 Seneca Dr.,
Mt. Vernon, Wash. 98273[21] Appl. No.: **788,683**[22] Filed: **Jan. 24, 1997**

3,900,732	8/1975	Costales	29/271
4,092,770	6/1978	Polashak	29/283
4,330,925	5/1982	Kato et al.	29/464
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4,499,644	2/1985	Goldsby	29/281.6
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Related U.S. Application Data

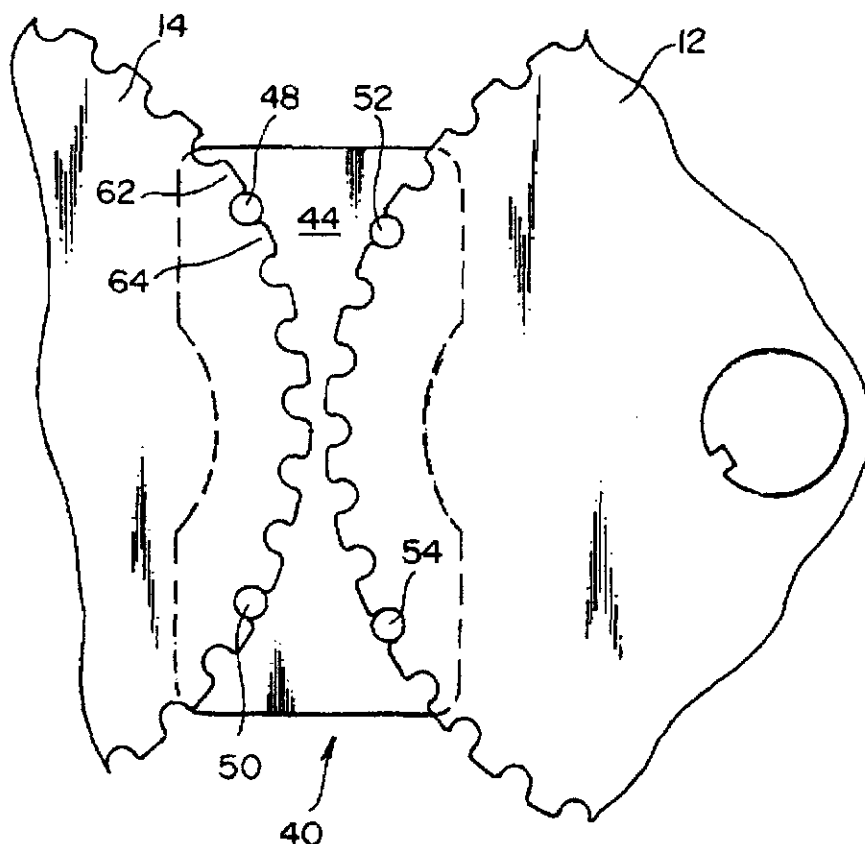
[62] Division of Ser. No. 337,895, Nov. 14, 1994, abandoned.

[51] Int. Cl.⁶ **B23P 6/00**[52] U.S. Cl. **29/888.011; 29/402.03;**
29/402.08; 29/426.1; 29/464; 29/559[58] Field of Search **29/402.03, 402.08,**
29/426.1, 464, 559, 407.09, 407.1, 888.011,
281.1, 281.6, 283[56] **References Cited****U.S. PATENT DOCUMENTS**

2,404,456	7/1946	Pierce	29/464
2,621,807	12/1952	Rendich	269/900
3,463,478	8/1969	Hennessey	269/900

*Primary Examiner—Joseph M. Gorski**Attorney, Agent, or Firm—Richardson & Polise*[57] **ABSTRACT**

A camshaft alignment tool and method uses a main body having at least three projections to engage cogs on cog wheel driven double overhead camshafts. The tool is used to maintain the cog wheels in a fixed relationship with respect to one another during replacement of a cooperatively toothed timing belt. Use of the tool enables a single technician to change the timing belt on a high performance internal combustion engine employing double overhead camshafts even if the cam surfaces are aggressive and the valve return springs employ large spring constants.

2 Claims, 3 Drawing Sheets

U.S. Patent

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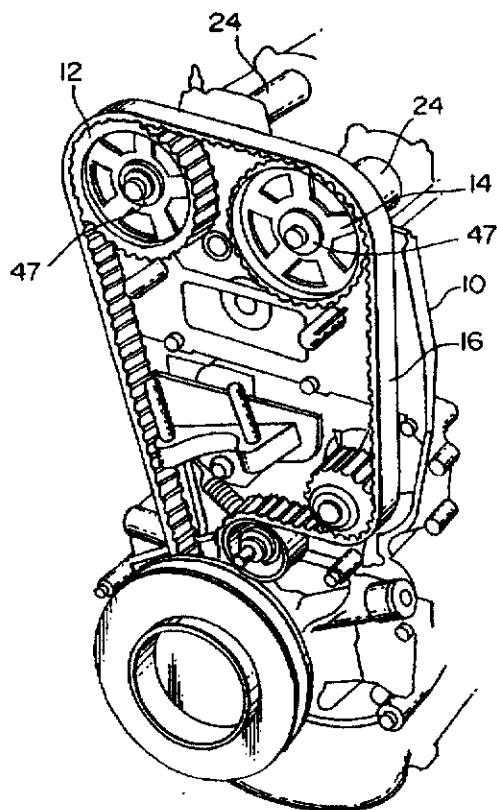


FIG. 1

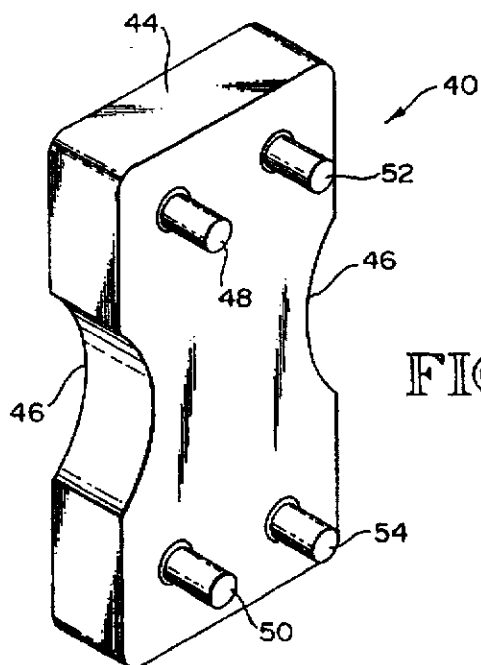
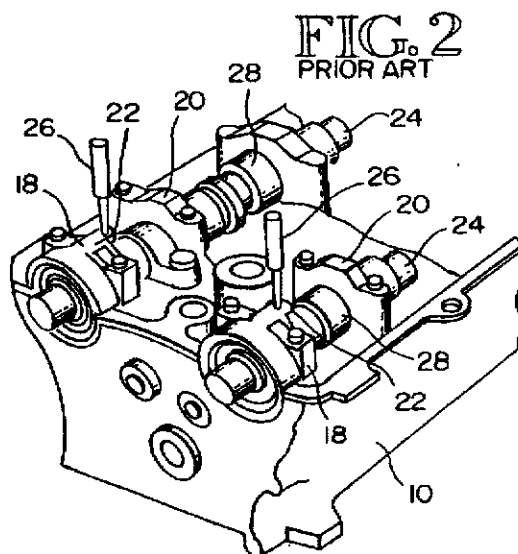


FIG. 3

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FIG. 4

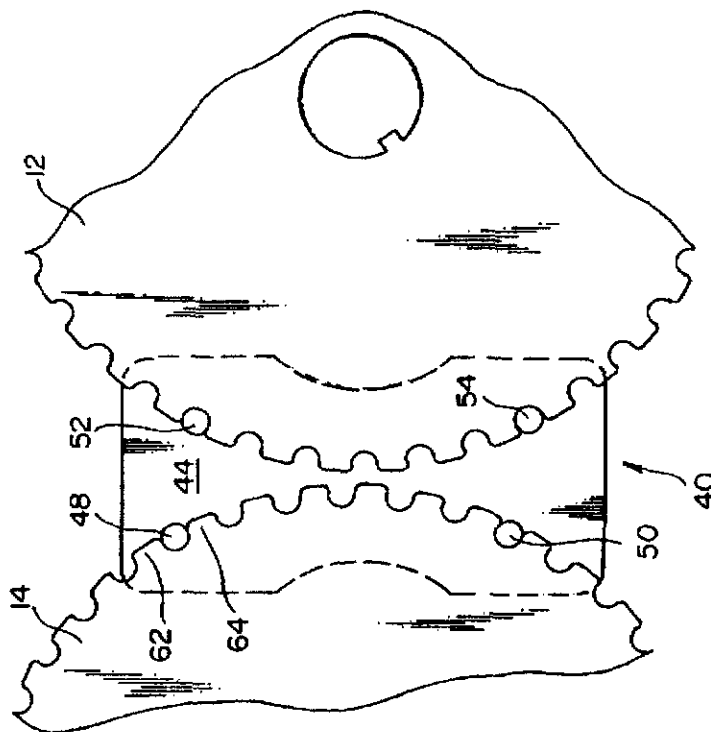
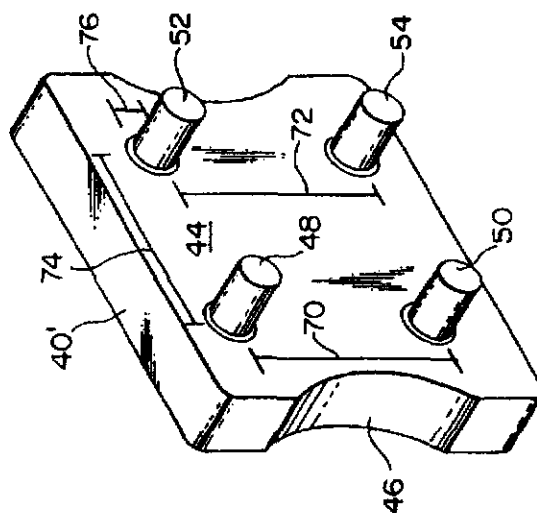


FIG. 10



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FIG. 5

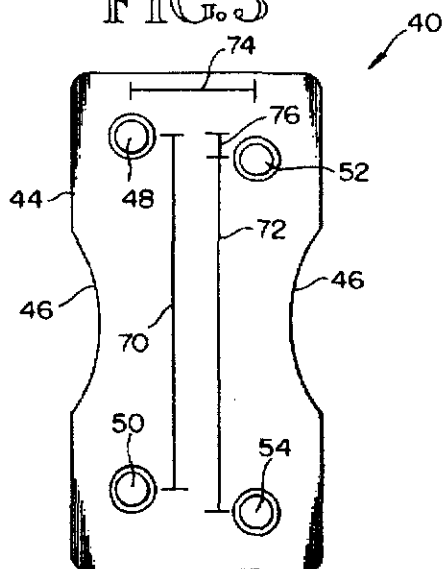


FIG. 6

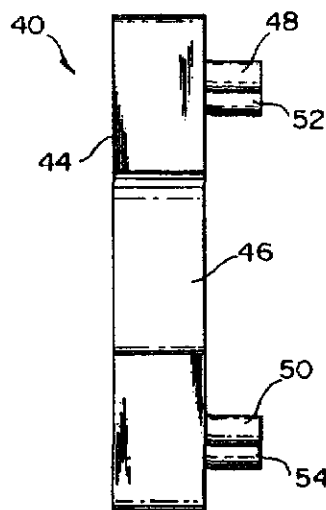


FIG. 7

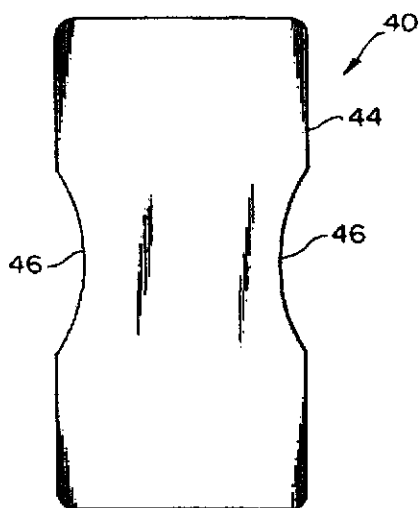
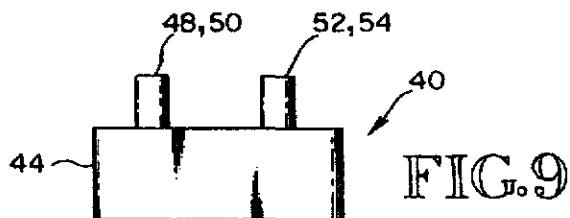
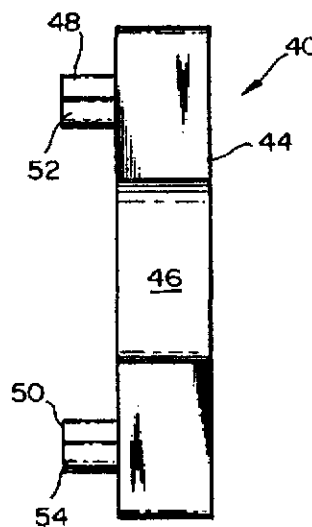


FIG. 8



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DOUBLE OVERHEAD CAMSHAFT ALIGNMENT METHOD

RELATED APPLICATIONS

This application is a divisional of U.S. application Ser. No. 08/337,895 filed on Nov. 14, 1994 and now abandoned.

TECHNICAL FIELD

The invention relates to tools and techniques for repairing internal combustion engines. More specifically, the invention relates to a method and apparatus for maintaining the timing position of double overhead camshafts during replacement or reinstallation of a toothed, timing belt.

BACKGROUND OF THE INVENTION

Overhead camshaft internal combustion engines have almost entirely replaced older style, overhead valve engines employing rocker arms, and connecting rods actuated by a camshaft adjacent to the crankcase of the internal combustion engine. In such prior technology engines, the camshaft was typically rotationally coupled to the crankshaft by intermeshed sprockets. Therefore, the timing of the camshaft with respect to the crankshaft was relatively fixed and capable of only minor adjustment by relative rotation and reattachment of the camshaft with its crankshaft engaging sprocket.

Overhead camshafts have eclipsed the old style push rods engine primarily due to the increased performance of the overhead camshaft engine, and manufacturing economy. In this modern type of engine, the engine crankshaft is journaled to a cogged, crankshaft pulley which engages a cooperatively toothed belt. The toothed belt also engages a cog wheel on each camshaft which drives the same. Periodically, the toothed belt must be replaced so that timing between the camshaft and the crankshaft are not lost during engine operation due to belt breakage. In addition, the toothed belt is often removed and reinstalled during repair or replacement of water pumps, seals, and the like.

In a single overhead camshaft engine, such replacement is relatively straightforward. There is generally provided a timing mark on the engine itself which is aligned with a corresponding timing mark on the camshaft cog wheel. A similar set of marks are typically provided for the crankshaft cog wheel as well. Rotating the crankshaft cog wheel to the correct timing position is relatively easy as the forces tending to rotate the crankshaft to any given position are relatively minor. However, depending on the strength of the valve springs which bias the overhead valves to a closed position, and the aggressiveness of the cam surfaces, the camshaft cog wheel is biased to a plurality of rest positions which typically do not cooperatively align the camshaft cog wheel timing mark with its attendant mark on the engine housing at top dead center, number one cylinder. Nevertheless, an automobile technician can relatively easily hold the camshaft cog wheel in place with one hand, while using the free hand to place the belt on the camshaft cog wheel, and the crankshaft cog wheel.

The repair procedure described above becomes somewhat more difficult in a double overhead camshaft engine. For example, in the conventional in-line, four cylinder double overhead camshaft engine 10 shown in FIG. 1, two adjacent camshaft cog wheels 12, 14 must be maintained in the appropriate timing position, top dead center cylinder number one position while the timing belt 16 is replaced. In an engine employing a single exhaust and intake valve per

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cylinder, a technician can generally, if somewhat difficulty maintain both camshaft cog wheels in their appropriately timed position with the fingers of one hand, while the other hand replaces the belt. However, the difficulty of this task increases dramatically in an engine employing four valves (i.e., two intake and two exhaust) per cylinder, with aggressive cam surfaces and valve return springs having large spring constants as is typical of today's, high performance four cylinder engines. In fact, it is virtually impossible for a technician of ordinary strength to hold both camshaft cog wheels 12, 14 in place with one hand, while the free hand is used to replace the timing belt 16. Thus, two technicians are often necessary to effect such a timing belt replacement.

At least one automobile manufacturer has addressed this problem by modifying the forward camshaft bearing saddle 18 as shown in FIG. 2 of the internal combustion engine 10. In contrast to the more rearwardly displaced camshaft bearing saddles 20, the forward saddles are provided with projections 22 having bores therethrough which cooperate with radial bores (not shown) in the camshafts 24. Individual, pin-like alignment tools 26 can be inserted through the bores in their projections 22 and the camshafts 24 to hold the cog wheels 12, 14 in their respective, timed positions. Unfortunately, due to the very large spring constants of the overhead valve springs, the aggressive surfaces of the cams 28, and the loose tolerances of the tools 26 with respect to the bores, it is possible for a technician to misalign the cog wheels 12, 14 with respect to one another by at least a single tooth, or cog, during the belt replacement procedure. Such a result is highly undesirable. Therefore, a need exists for a camshaft alignment tool and method for maintaining the timing positioning of adjacent cog wheels on internal combustion engines employing cog wheel equipped double overhead camshafts during replacement of the timing belt.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a camshaft alignment tool for maintaining the timing positioning of adjacent cog wheels on internal combustion engines employing cog wheel equipped double overhead camshafts driven by a cooperatively toothed timing belt during replacement of the belt.

It is a further object of the invention to achieve the above object by employing a method for replacing a timing belt on an internal combustion engine employing cog wheels of the type described above by directly and simultaneously fixing the cog wheels to one another while the belt is replaced with a single fixation tool.

These objects, and other objects and advantages of the invention which will become apparent from the description which follows, are achieved by providing a camshaft alignment tool having a main body defining a reference plane. At least three cog engaging members project transversely from the reference plane and are spaced apart relative to one another so that at least two of the projections can positively engage two pairs of cogs in one of the cog wheels, and so that the remaining projection can engage a pair of cogs on the remaining cog wheels whereby relative positioning of the cog wheel is maintained against torque induced on the camshaft by the valve springs during replacement of the timing belt. The tool is applied to the cog wheels before the timing belt is removed, and is removed from the cog wheel after the timing belt has been replaced. A single technician can perform this operation without assistance.

In the preferred embodiment of the invention, four projections are used. The projections are arranged in two pairs

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with the first pair positioned for engagement of a first cog wheel, and a second pair positioned for engagement of a second cog wheel. The spacing and positioning of the projections are selected appropriately for the mechanical dimensions of different sized cog wheels and engines.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric, environmental view of a modern, double overhead camshaft engine employing two cog wheel driven camshafts and a cooperatively toothed timing belt.

FIG. 2 is a partial isometric view of a double overhead camshaft alignment tool technique presently employed in certain automobiles.

FIG. 3 is an isometric, full scale view of an alignment tool of the present invention.

FIG. 4 is a schematic representation illustrating the tool shown in FIGS. 3-10 positioned on adjacent camshaft cog wheels of an internal combustion engine.

FIG. 5 is a front elevational view of the tool shown in FIG. 3.

FIG. 6 is a left side elevational view of the tool of FIG. 3.

FIG. 7 is a rear elevational view of the tool of FIG. 3.

FIG. 8 is a right side elevational view of the tool shown in FIG. 3.

FIG. 9 is a top plan view of the tool shown in FIG. 3 as well as a mirror image of a bottom plan view of the tool of FIG. 3.

FIG. 10 is an isometric, full scale view of an alternate embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A camshaft alignment tool, in accordance with the principles of the invention is generally indicated at reference numeral 40 in FIGS. 3-9. The tool is adapted for use on an automobile engine 10 of the type employing double overhead camshafts 24 journaled for rotation with cog wheels 12, 14 which are themselves driven by a toothed timing belt 16 in a manner well known by those of ordinary skill in the automotive repair art.

The tool 40 has a main body 44 of generally rectangular shape having a height of approximately 3 inches, a width of approximately 1 1/8 inches, and a depth of approximately 1/2 inch. The body is preferably made of a relatively rigid yet inexpensive material such as aluminum. The body may be provided with sculpted out portions 46 which are primarily ornamental in nature, although such portions may provide clearance for bolts 47 used to secure the cog wheels 12, 14 on the camshaft 24. Moreover, portions 46 may also serve as an indication of source to the relevant consuming public.

The main body 44 is preferably provided with four transverse protrusions 48, 50, 52, and 54 in the form of cylindrical steel pins having a length of approximately 3/16 inch and a diameter of approximately 3/16 inch. Although four projections are shown and preferred, at least three would suffice. As best shown in FIG. 4, these protrusions engage pairs of adjacent cogs or teeth (62, 64 for example) on each cog wheel such that the relative positions of the cog wheels 12, 14 are fixed while the tool remains installed and the timing belt 16 is replaced.

It is preferred that the relative positioning of the protrusions 48, 50, 52, and 54 be selected so as to closely and frictionally engage adjacent pairs of teeth on the cog wheels

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12, 14 precisely so as to avoid slipping of the cog wheels or relative movement of the cog wheels. To this end, and as best seen in FIG. 5, projections 48 and 50 are arranged as a first pair having a first pair separation distance 70 of 54 mm. and wherein the projections 52, 54 form a second pair defining a second pair separation distance 72 also of 54 mm. A first reference line connecting projections 40-50 is substantially parallel to a second reference line connecting the projections 52, 54 wherein the reference lines are substantially parallel and define a reference line separation distance 74 of approximately 17 mm. It is also preferred for certain automobile brands that the first and second pairs be vertically offset as shown in FIG. 5 by a "misalignment distance" 76 of approximately 3 mm. All distances are measured on center of the projections 48, 50, 52 and 54 which as described above are cylindrical steel pins. The dimensions described above for the embodiment of FIGS. 3-9 are selected to closely engage the cogs or teeth, such as teeth 62, 64 of an Accura brand 1986-1989 Integra model automobile.

To use the tool 40, the camshaft 24 should be aligned at top dead center, cylinder number one thereby positioning the cog wheels 12, 14 in a respective correctly timed position. The tool 40 is then applied to the cog wheels so that protrusions 48, 50, 52 and 54 engage cogs on the cog wheels. The timing belt 16 can then be removed and/or replaced using both hands while the cog wheels remain stationary. The tool 40 can also be used to maintain the relative position of the cog wheels while the bolts 47 are loosened or tightened thereby avoiding stressing the belt 16 or disturbing the relative position of the camshaft 24 which are journaled by keys to the cog wheels. Such operation frequently occurs during camshaft seal replacement.

As shown in FIG. 10, an alternate embodiment 40' can be provided wherein like reference numerals refer to similar structure as for the preferred embodiment shown in FIGS. 4-9. In the alternate embodiment 40' shown in FIG. 10, the first and second pair separation distances 70, 72 are both approximately 28 mm, the reference line separation distance 74 is approximately 26 mm, and the misalignment distance 76 is approximately 3 mm. The dimensions described hereinabove for the alternate embodiment 40' are selected to positively engage cog wheels 12, 14 of a 1988-1989 Honda brand Prelude SI model automobile. The method of use of the alternate embodiment 40' shown in FIG. 10 is identical to that described for the embodiment shown in FIGS. 4-9. Upon further review and contemplation of this disclosure and the accompanying drawings, those of ordinary skill in the art will be able to devise other dimensional relationships between the projections 48, 50, 52 and 54 to engage the cog wheels on other double overhead camshaft engines.

In addition, those of ordinary skill in the art will devise other embodiments and variations of the invention which although not shown fall within the spirit of this disclosure. For example, the main body 44 need not be solid as shown but may be of a spider or truss configuration. Therefore, the invention is not to be limited by the above description, but is to be determined in scope by the claims which follow.

I claim:

1. A method for replacing a timing belt, comprising the steps of:

providing an internal combustion engine employing double overhead camshafts, with each camshaft having a cog wheel attached thereto, and a toothed timing belt engaging cogs of the cog wheels and driving said camshafts;

providing a fixation tool having a main body with at least three projecting pins extending therefrom;