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(54) **APPARATUS, A SYSTEM FOR SEPARATING A GEAR FROM A CAMSHAFT**

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See application file for complete search history.

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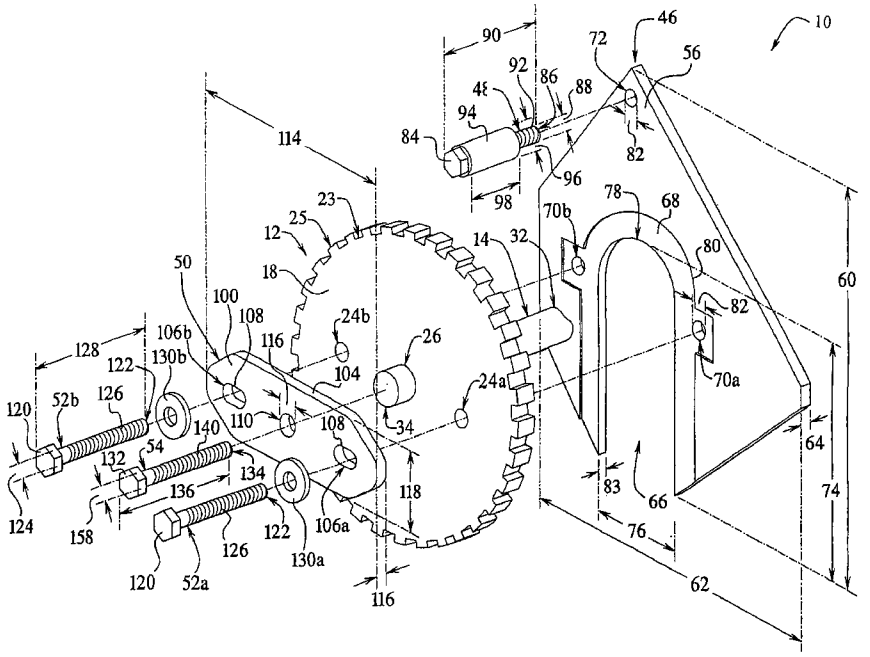
(57) **ABSTRACT**

An apparatus, a system and a method are provided to separate a gear from a shaft. The apparatus, the system and the method implement a base plate, a handle, a face plate, a first fastener, a second fastener, and/or a press. The gear is attached to a shaft of a motor. The fasteners connect and/or attach the face plate to the base plate. The fasteners extend through a passage in the gear. The gear is positioned between the face plate and the base plate which abuts a backside of the gear. The press is inserted into a central hole of the face plate and/or abuts a second side of the gear. The base plate maintains the gear in a stationary position with respect to the face plate and/or the press. The press engages the shaft and/or pulls the gear inward with respect to the face plate. As a result, a first side of the base plate moves the gear inward with respect to the face plate.

14 Claims, 3 Drawing Sheets



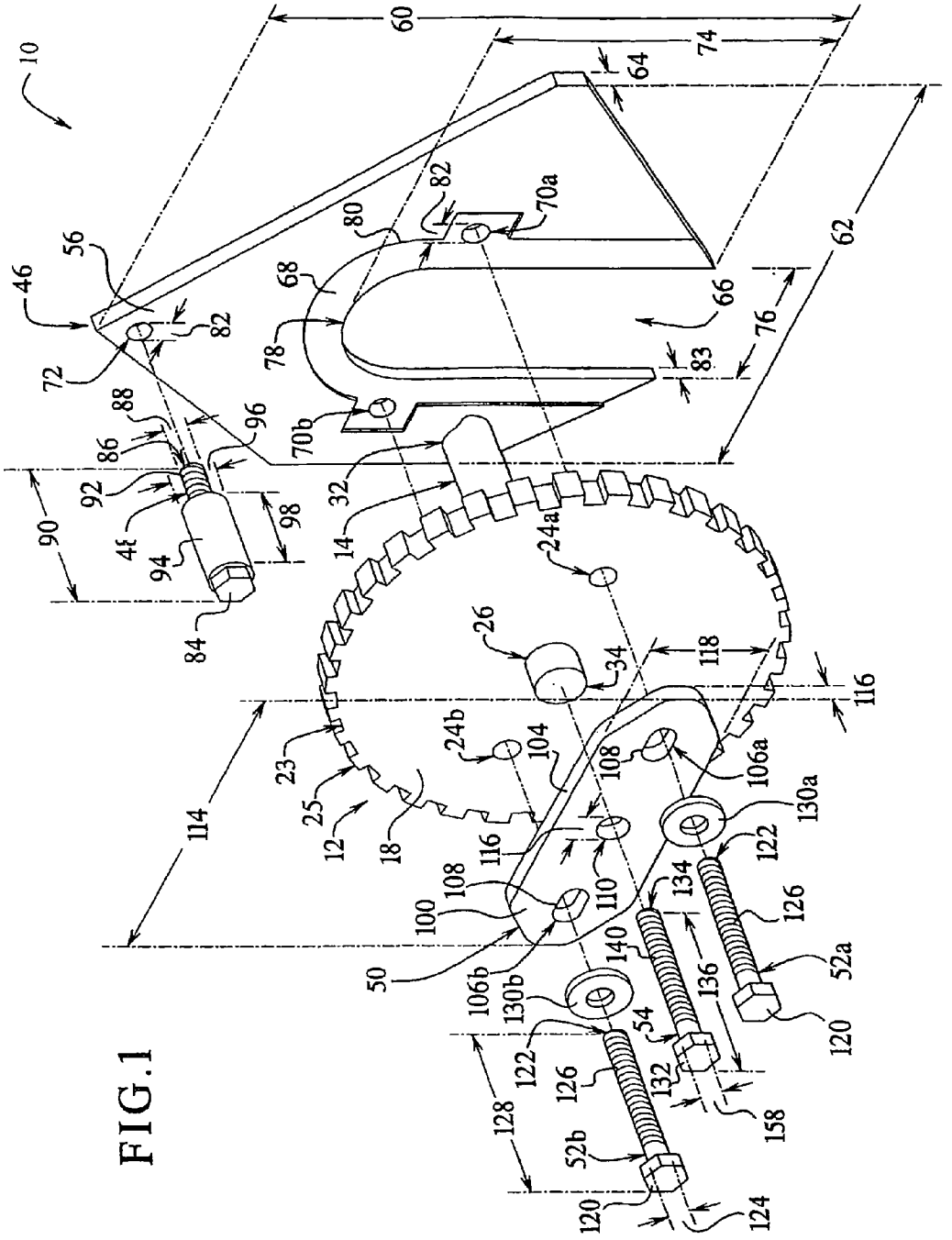

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FIG.1

FIG. 2

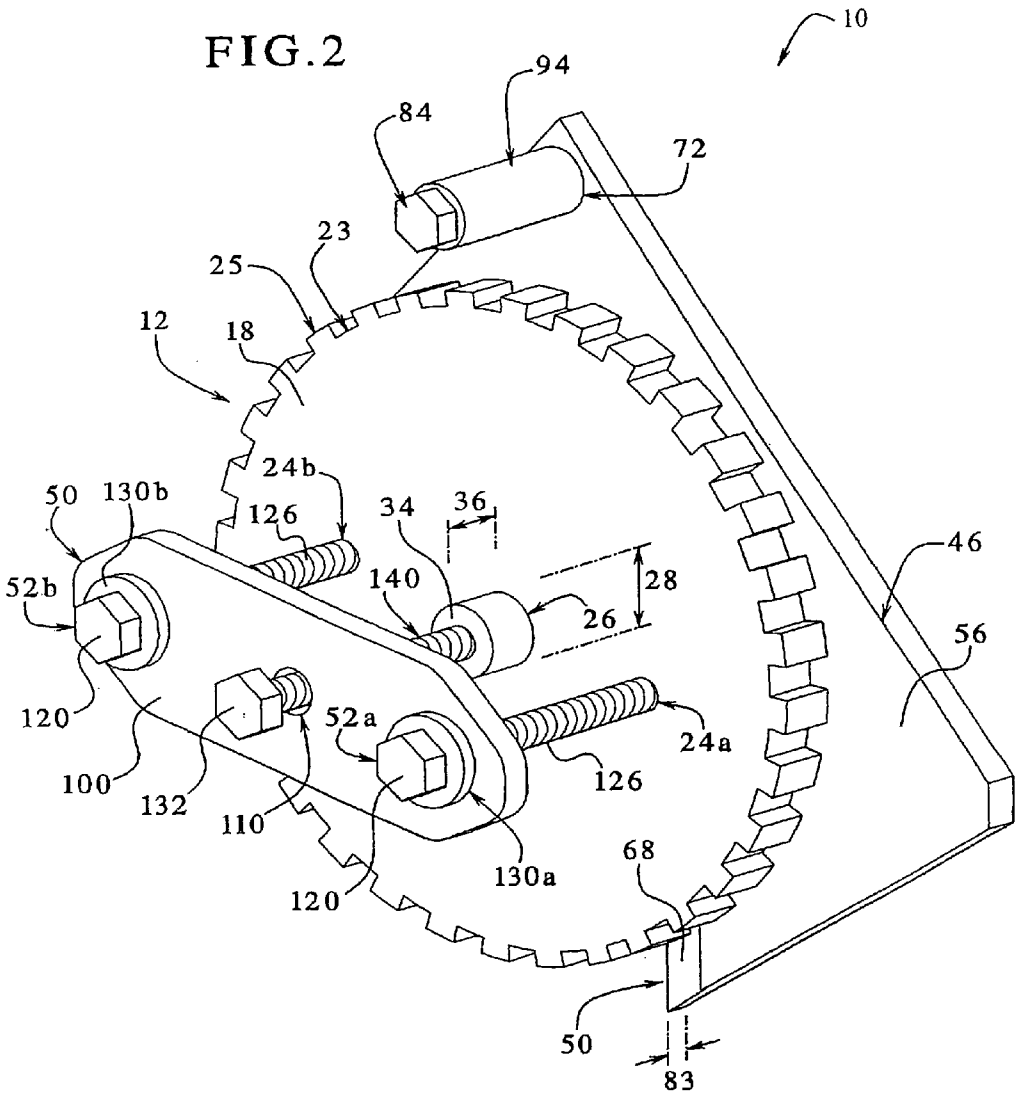
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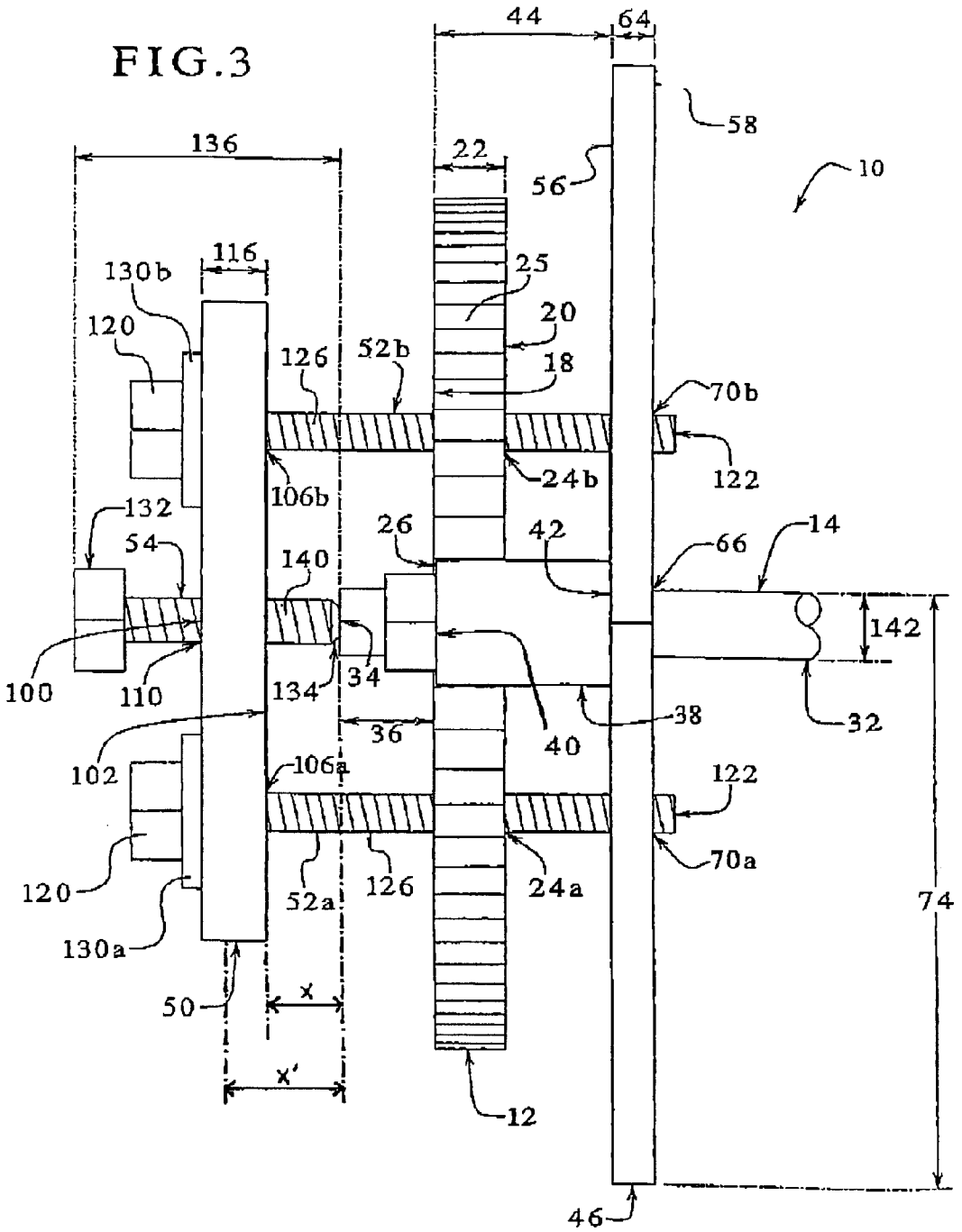
FIG.3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110
134
34
36
40
38
32
102
106a
122
120
52a
126
24a
70a
74
130a
50
x
x'
12
46

APPARATUS, A SYSTEM FOR SEPARATING A GEAR FROM A CAMSHAFT

BACKGROUND OF THE INVENTION

The present invention generally relates to an apparatus, a system and a method for separating a gear from a shaft. More specifically, the present invention generally relates to an apparatus, a system and a method for separating a gear from a camshaft of an engine. The apparatus, the system and the method may have a base plate, a handle, a face plate, a first fastener, a second fastener, and/or a press. The camshaft may extend from a motor of, for example, an automobile, a motorcycle, a diesel truck, a moped and/or the like. A thrust plate may be located between the gear and the motor. The gear may be, for example, press-fitted to the shaft. Still further, the first fastener and/or the second fastener may attach the face plate to the base plate and/or may extend through a first passage and/or a second passage in the gear. The base plate may abut a backside of the gear and/or may be located between the thrust plate and/or the gear and the motor. The press may be inserted into a central hole in the face plate such that a first end of the press abuts a second side of the gear. The press and/or the first fastener and/or the second fastener may be, for example, a screw, a bolt and/or the like. The base plate may hold, may restrain and/or may maintain the gear in a stationary position with respect to the face plate and/or the press. The press may engage the shaft and/or may pull the gear and/or the thrust plate outward with respect to the motor. The press may have a length which may allow the gear to be pulled from the shaft and/or to be separated from the shaft and/or the motor.

It is generally known that a gear is attached to a shaft and/or may be, for example, press-fitted to the shaft. The gear may be attached to the shaft in such a way to prevent or prohibit the gear from separating from the shaft. Further, a tool is traditionally required to aid a user with the removal and/or separation of the gear from the shaft. The tool exerts an outward force with respect to the motor. The gear moves outward with respect to the motor to separate from the shaft. Still further, the tool may be, for example, a hammer used by, for example, a mechanic to tap the gear off the shaft and/or outward with respect to the motor. However, the use of a tool to remove a gear from a shaft may result in, for example, damage to the gear, a thrust plate and/or teeth of the gear. Additionally, a press-fitted gear requires a large amount of force to be exerted upon the gear for removal of the gear from the shaft. Traditionally, the tool fails to exert the required force to separate the gear from the shaft and/or damages the gear, the thrust plate and/or the teeth of the gear during the removal of the gear from the shaft.

A need, therefore, exists for an apparatus, a system and a method for separating a gear from a camshaft. Additionally, a need exists for an apparatus, a system and a method for separating a gear from a camshaft which may prevent damage to the gear, the thrust plate and/or the teeth of the gear during the removal of the gear from the camshaft. Further, a need exists for an apparatus, a system and a method for separating a gear from a camshaft which may allow the gear to be removed from the camshaft while the camshaft remains inside and/or attached to the motor. Further, a need exists for an apparatus, a system and a method for separating a gear from a camshaft which allows the thrust plate to be removed from the shaft and/or to be separated from the motor. Still further, a need exists for an apparatus, a system and a method for separating the gear from the camshaft which may require a user to exert minimal force to remove the gear and/or the thrust plate from the camshaft.

SUMMARY OF THE INVENTION

The present invention generally relates to an apparatus, a system and a method for separating a gear from a shaft. More specifically, the present invention generally relates to an apparatus, a system and a method for separating a gear from a camshaft of an automobile engine. The apparatus, the system and the method may have a base plate, a handle, a face plate, a first fastener, a second fastener, and/or a press. Further a thrust plate may be located between the gear and the motor. Still further, the first fastener and/or the second fastener may connect and/or attach the face plate to the base plate. The first fastener and/or the second fastener may extend through a first passage and/or a second passage in the gear.

The gear may be positioned between the face plate and the base plate which may abut a backside of the gear and/or may be located between the thrust plate and/or the gear and the motor. The press may be inserted into a central hole of the face plate. The base plate may hold, may restrain and/or may maintain the gear in a stationary position with respect to the face plate and/or the press. The press may engage the shaft and/or may pull the gear outward with respect to the motor. The press may have a length which may allow the gear and/or the thrust plate to be pulled from the shaft and/or to be separated from the shaft and/or the motor.

In an embodiment of the present invention, an apparatus for separating a gear from a shaft having a first end and a second end opposite to the first end wherein the gear has a first side and a second side opposite to the first side wherein the gear has a passage extending through the gear from the first side to the second side of the gear and further wherein the gear is between the first end and the second end of the shaft is provided. The apparatus has a base having a notch, a front side and a backside opposite to the front side wherein the notch extends through the base from the first side to second side and further wherein the notch receives the shaft between the first side of the gear and the first end of the shaft wherein the front side of the base covers the first side of the gear. Further, the apparatus has a plate having a first side and a second side opposite to first side. Still further, the apparatus has a first fastener that attaches the plate to the base wherein the first fastener extends through the passage of the gear from the second side of the plate to the front side of the base wherein the front side of the base abuts the first side of the gear. Moreover, the apparatus has a press between the second side of the plate and the second end of the shaft.

In an embodiment, the apparatus has a hole in the base.

In an embodiment, the apparatus has a handle attached to the base.

In an embodiment, the apparatus has a slot in the plate.

In an embodiment, the apparatus has a recession surrounding the notch on the front side of the base.

In an embodiment, the first fastener has a threading.

In an embodiment, the press has a threading.

In an embodiment, the apparatus has a second fastener attaching the plate to the base.

In another embodiment of the present invention, a method for pulling a gear from a shaft wherein the gear has a first side and second side opposite to the first side is provided. The method has the steps of providing a base having a notch, a front side and a backside opposite to the front side wherein the notch extends through the base from the front side to backside of the base and connecting the notch of the base to

the shaft wherein the front side of the base covers the first side of the gear. Further, the method has the step of attaching a plate to the base wherein the plate has a first side and a second side opposite to the first side and further wherein the second side of the plate is adjacent to the shaft and the second side of the gear. Moreover, the method has the step of pulling the gear inward with respect to the second side of the plate from the shaft with the front side of the plate.

In an embodiment, the method has the step of extending a fastener through the passage of the gear.

In an embodiment, the method has the step of inserting a press between the second side of the plate and the second end of the gear.

In an embodiment, the method has the step of pressing the plate outward with respect to the second end of the gear.

In an embodiment, the method has the step of pushing the gear outward with respect to the first end of the shaft with the front side of the base.

In an embodiment, the method has the step of attaching a handle to the base.

In another embodiment of the present invention, a system for separating a gear from a shaft wherein the gear has a passage extending through the gear is provided. The system has a base having a notch, a front side and a backside opposite to the front side wherein the notch extends through the base from the first side to the second side and further wherein the notch receives the shaft between the first side of the gear and the first end of the shaft wherein the front side of the base covers the first side of the gear. Further, the system has a pulling means connected to the base wherein the pulling means is adjacent to the gear and further wherein the pulling means extends through the passage of the gear to the front side of the base.

In an embodiment, the pulling means is a press abutting the second end of the shaft.

In an embodiment, the system has a fastener attaching the pulling means to the base via the passage of the gear.

In an embodiment, the system has a hole in the base.

In an embodiment, the system has a recession surrounding the notch on the front side of the base.

In an embodiment, the system has a plate enclosed between the first side of the gear and the front side of the base.

It is, therefore, an advantage of the present invention to provide an apparatus, a system and a method for separating a gear from a camshaft.

Another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which allows the removal of the gear from the shaft while the shaft remains connected to the motor.

Yet another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which allows a press to exert force on an end of the shaft to pull a gear from a shaft.

And, another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which is inexpensive.

Yet another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which is easy to assemble.

A further advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which prevents damage to a thrust plate during the removal of the gear and/or the thrust plate from the shaft.

Moreover, an advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which prevents damage to the gear during the removal of the gear from the camshaft.

And, another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from the camshaft which prevents damage to the camshaft during the removal of the gear from the camshaft.

Yet another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which prevents damage to the teeth of the gear during the separation of the gear from the camshaft.

Another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which provides a press to remove a gear from the camshaft.

Yet another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which allows a user to exert a torque force upon a press to remove the gear from the camshaft.

A still further advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which prevents injury to a user during removal of a gear from the camshaft.

Moreover, an advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which may provide a recession for removal of a thrust plate adjacent to the gear.

And, another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which provides a recession for the removal of a thrust plate from the shaft to prevent damage to the thrust plate during removal of the thrust plate from the shaft.

Yet another advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which provides a handle to facilitate easy attachment of the base to the gear and/or the camshaft.

Moreover, an advantage of the present invention is to provide an apparatus, a system and a method for separating a gear from a camshaft which pulls the gear to be pulled outward with respect to the motor and/or pulls the gear inward with respect to a face plate.

Additional features and advantages of the present invention are described in, and will apparent from, the detailed description of the presently preferred embodiments and from the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates an exploded perspective view of an apparatus attached to a gear and/or a camshaft in an embodiment of the present invention.

FIG. **2** illustrates a perspective view of an apparatus attached to a gear and/or a camshaft in an embodiment of the present invention.

FIG. **3** illustrates a side plan view of the apparatus attached to the gear and/or the camshaft of FIG. **2** in an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

The present invention generally relates to an apparatus, a system and a method for separating a gear from a shaft. More specifically, the present invention generally relates to an apparatus, a system and a method for separating a gear from a camshaft of an engine. The apparatus, the system and

the method may have a base plate, a handle, a face plate, a first fastener, a second fastener, and/or a press. The gear may be connected and/or may be attached to a shaft, such as, for example, a camshaft of a motor, such as, for example, an automobile, a motorcycle, a diesel truck, a moped and/or the like. A thrust plate may be located between the gear and the motor. The gear may be, for example, press-fitted to the shaft. Still further, the first fastener and/or a second fastener may connect and/or may attach the face plate to the base plate. The first fastener and/or the second fastener may extend through the gear via a first passage and/or a second passage, respectively, in the gear. The base plate may abut a backside of the gear and/or may be located between the thrust plate and/or the gear and the motor. The press may be inserted into and/or may engage a central hole in the face plate. As a result, a first end of the press may abut a second side of the gear. The press and/or each of the pair of fasteners may be, for example, a screw, a bolt and/or the like. The base plate may hold, may retain and/or may maintain the gear in a stationary position with respect to the face plate and/or the press. The press may engage the shaft and/or may pull the gear inward with respect to the face plate. The press may have a length which may allow the gear to be pulled from the shaft and/or to be separated from the shaft and/or the motor.

Referring now to the drawings wherein like numerals refer to like parts, FIGS. **2** and **3** illustrate an apparatus **10** for separating a gear **12** from a shaft **14** which may be attached and/or may be connected to a motor (not shown). The shaft **14** may be, for example, a camshaft of the motor. The motor may be from, for example, an automobile, a motorcycle, a moped, a snowmobile, a diesel truck and/or the like.

The gear **12** may have a front side **18**, a backside **20**, a thickness **22** and/or a perimeter **23**. The backside **20** may be opposite to the front side **18**. Further, the perimeter **23** may have teeth **25** attached thereon. Still further, the gear **12** may have a first passage **24***a* and/or a second passage **24***b* and/or an orifice **26** which may be located between the passages **24***a*, **24***b*. The first passage **24***a* and/or the second passage **24***b* may have a diameter **28**. The orifice **26** may have a diameter **30**. The gear **12**, the orifice **26** and/or the passages **24***a*, **24***b* may have a shape, such as, for example, a circle. The present invention should not be deemed as limited to a specific diameter of the passages **24***a*, **24***b*.

The shaft **14** may have a first end **32** and/or a second end **34**. The second end **34** may be opposite to the first end **32**. The second end **34** may be attached to and/or may be connected to the motor. The first end **32** may extend outward with respect to the motor. The first end **32** may be inserted into and/or may extend through the orifice **26** of the gear **12** from the front side **18** to the backside **20**. The first end **32** may extend outward with respect to the first side **18** of the gear. The shaft **14** may have an extended length **36** which may extend from the first end **32** of the shaft **14** to the front side **18** of the gear **12**. The gear **12** may be attached to the shaft **14** by, for example, press-fitting and/or the like. Moreover, the present invention should not be deemed as limited to a specific extended length of the shaft **14**. It should be understood that the gear **12** may be attached to the shaft **14** by any method that may be implemented by one having ordinary skill in the art.

As illustrated in FIGS. **1** and **3**, a thrust plate **38** may have a front side **40**, a backside **42** and/or a thickness **44**. The backside **42** may be opposite to the front side **40**. The thrust plate **38** may be connected to the shaft **14**. The front side **40** of the thrust plate **38** may abut the backside **20** of the gear **12**. The shaft **14**, the gear **12** and/or the thrust plate **38** may be made from, for example, steel or the like. Further, the present invention should not be deemed as limited to a specific thickness of the thrust plate **38**. It should be understood that the thrust plate **38** may be attached to the shaft **14** by any method that may be implemented by one having ordinary skill in the art. The apparatus **10** may have a base plate **46**, a handle **48**, a face plate **50**, a first fastener **52***a*, a fastener **52***b* and/or a press **54**. The base plate **46** may have a front side **56**, a backside **58**, a height **60**, a length **62** and/or a width **64**. The backside **58** may be opposite to the front side **56**. The length **62** may be, for example, six inches. The width **64** may be, for example, six inches. The height **60** may be, for example, five-sixteenths of an inch. Further, the base plate **46** may have a notch **66**, a recession **68**, a first mounting hole **70***a*, a second mounting hole **70***b* and/or a handle hole **72**. The base plate **46** may be made from a material, such as, for example, steel and/or the like. The present invention should not be deemed as limited to a specific material, a specific length, a specific width and/or a specific height of the base plate **46**.

The notch **66** may have a length **74**, a width **76**, and/or an end **78**. The notch **66** may extend through the base **46** from the front side **56** to the backside **58**. The length **74**, may be, for example, four and one-half inches. The width **76** may be, for example, two inches. Further, the notch **66** may be, for example, U-shaped. Still further, the end **78** of the notch **66** may be, for example, rounded. The present invention should not be deemed as limited to a specific length, a specific shape and/or a specific width of the notch **66** of the base plate **46**.

The recession **68** may be located on, for example, the front side **56** of the base plate **46**. Further, the recession **68** may surround the notch **66** on the front side **56** of the base plate **46**. The recession **68** may have a perimeter **80** and/or a height **83**. The height **83** of the recession **68** may be, for example, one-sixteenth of an inch. The present invention should not be deemed as limited to a specific height of the recession **68**.

The mounting holes **70***a*, **70***b* may be located within the recession **68**. Further, the mounting holes **70***a*, **70***b* may have a diameter **82**. The handle hole **72** may be located adjacent to the end **78** of the notch **66**. The handle hole **72** may have a diameter **82**. The diameter **82** of the mounting holes **70***a*, **70***b* and/or the handle hole **72** may be, for example, seven-sixteenths of an inch. Further, the handle hole **72** and/or each of the mounting holes **70***a*, **70***b* may be, for example, threaded. Still further, the mounting holes **70***a*, **70***b* and/or the handle hole **72** may extend through the base plate **46** from the front side **56** to the backside **58**. The present invention should not be deemed as limited to a specific diameter of the mounting holes **70***a*, **70***b* and/or the handle hole **72**.

The handle **48** may have a first end **84**, a second end **86**, a diameter **88** and/or a length **90**. The second end **86** may be opposite to the first end **84** and/or may have a threading **92** thereon. Further, the handle **48** may have a housing **94** which may have a first end **95**, a second end **97**, a diameter **96** and/or a length **98**. The second end **97** may be opposite to the first end **95**. The diameter **88** of the handle **48** may be less than the diameter **96** of the housing **94**. The length **90** of the handle **48** may be longer than the length **98** of the housing **94**. The handle **48** may be inserted into the housing **94**. As a result, the second end **86** of the handle **48** may extend outward with respect to the second end **97** of the housing **94**. Still further, the first end **84** of the handle **48** may abut the first end **95** of the housing **94**. The threading **92** on the second end **86** of the handle **48** may be inserted into and/or may connect to the handle hole **72**. The threading **92** of the

handle **48** may engage the handle hole **72**. The diameter **88** of the handle **48** may be, for example, equal to the diameter **82** of the handle hole **72**. The handle **48** may be attached to the base plate **48** via the handle hole **72**. As a result, the first end **84** of the handle **48** may extend outward with respect to the front side **56** of the base plate **46**. The second end **86** of the handle **48** may extend outward with respect to the backside **58** of the base plate **46**. The handle **48** and/or the housing **94** may be made from a material, such as, for example, steel and/or the like. The present invention should not be deemed as limited to a specific length, specific material and/or a specific diameter of the handle **48** and/or the housing **94**.

The apparatus **10** may have a face plate **50** which may have a first side **100**, a second side **102**, and/or a perimeter **104**. The second side **102** may be opposite to the first side **100**. Further, the face plate **50** may have a first slot **106***a*, a second slot **106***b* and/or a central hole **110**. Each of the slots **106***a*, **106***b* may have a perimeter **108** and/or may extend through the face plate **50** from the first side **100** to the second side **102**. The central hole **110** may be located between the slots **106***a*, **106***b*. The central hole **110** may have a diameter **112** and/or may extend through the face plate **150** from the first side **100** to the second side **102**. Still further, the face plate **50** may be made from a material, such as, for example, steel and/or the like.

The face plate **50** may have a length **114**, a width **118** and/or a height **118**. The length **114** of the face plate **50** may be, for example, five inches. The width **116** of the face plate **50** may be, for example, a one-half of an inch. The height **118** of the face plate **50** may be, for example, two inches. The face plate **50** and/or each of the slots **106***a*, **106***b* may have a shape, such as, for example, a circle, an oval and/or the like. The central hole **110** may have a shape, such as, for example, a circle. The present invention should not be deemed as limited to a specific shape, a specific material, a specific length, a specific width and/or a specific height of the face plate **50**. The present invention should not be deemed as limited to a specific shape and/or specific perimeter of each of the slots **106***a*, **106***b*. Additionally, the present invention should not be deemed as limited to a specific diameter of the central hole **110**.

The apparatus **10** may have a first fastener **52***a* and/or a second fastener **52***b* which may have a first end **120** and/or a second end **122**. The second end **122** may be opposite to the first end **120**. The second end **122** of each of the fasteners **52***a*, **52***b* may have a diameter **124** and/or a threading **126** thereon. The threading **126** of the fasteners **52***a*, **52***b* may engage the threading within each of the mounting holes **70***a*, **70***b*. Further, the diameter **124** of each of the fasteners **52***a*, **52***b* may be less than the diameter **82** of each of the mounting holes **70***a*, **70***b*. Still further, the fasteners **52***a*, **52***b* may be, for example, bolts, screws and/or the like. The diameter **124** of the fasteners **52***a*, **52***b* may be, for example, seven-sixteenths of an inch. The diameter **124** of each of the fasteners **52***a*, **52***b* may fit within the perimeter **108** of each of the slots **106***a*, **106***b*, respectively. As a result, each of the fasteners **52***a*, **52***b* may be inserted into and/or may extend through each of the slots **106***a*, **106***b*, respectively. The fasteners **52***a*, **52***b* may have a length **128** permitting each of the fasteners **52***a*, **52***b* to pass through the face plate **52** via the slots **106***a*, **106***b*, respectively, to engage the base plate **46**. Washers **130***a*, **103***b* may be implemented with the fasteners **52***a*, **52***b* during insertion into the face plate **50**. The washers **130***a*, **103***b* may be located between the first end **120** of the fasteners **52***a*, **52***b*, respectively, and the first side **100** of the face plate **50**. The fasteners **52***a*, **52***b* may be made from a material, such as, for example, steel and/or the like. The present invention should not be deemed as limited to a specific material, a specific length and/or a specific diameter of each of the fasteners **52***a*, **52***b*. Furthermore, it should be understood that the fasteners **52***a*, **52***b* may be any fastener that may be implemented by one having ordinary skill in the art.

The press **54** may have a first end **132**, a second end **134**, a length **136** and/or a diameter **138**. The second end **134** may have a threading **140** and/or may be opposite to the first end **132**. The threading **140** and/or the second end **134** of the press **54** may engage the central hole **110** and/or a threading within the central hole **110**. Further, the diameter **138** of the press **54** may be, for example, equal to the diameter **112** of the central hole **110**. Still further, the length **136** of the press **54** may be greater than the length **128** of the fasteners **52***a*, **52***b*. The press **54** may be, for example, a screw, a bolt and/or the like. The press **54** may be made from, for example, steel and/or the like. The present invention should not be deemed as limited to a specific material of the press **54**. It should be understood that the press **54** may be any press that may be implemented by one having ordinary skill in the art.

As illustrated by FIGS. **2** and **3**, the apparatus **10** may be assembled and/or attached to the shaft **14**, the thrust plate **38** and/or the gear **12** of the motor. The threading **92** of the second end **86** of the handle **48** may be inserted into the handle hole **72** of the base plate **46**. A user may use the handle **48** to hold and/or to maneuver the base plate **46**. The base plate **46** may be connected and/or may be attached to the shaft **14** of the motor. The notch **66** of the base plate **46** may receive the second end **34** of the shaft **14** of the motor. The base plate **46** may be positioned between the motor and the gear **12** and/or the thrust plate **38**. As a result, the front side **56** of the base plate **46** may abut the backside **42** of the thrust plate **38** and/or the backside **20** of the gear **12**. Further, the recession **68** of the base plate **46** may receive the thrust plate **38**. Still further, the thickness **44** of the thrust plate **38** may be less than the height **82** of the recession **68**. As a result, the thrust plate **38** may be positioned within the recession **68** of the base plate **46**.

The mounting holes **70***a*, **70***b* of the base plate **46** may align with the passages **24***a*, **24***b* of the gear **12**. Further, the diameter **28** of each of the passages **24***a*, **24***b* may be greater than the diameter **82** of each of the mounting holes **70***a*, **70***b* of the base plate **46**. Still further, the gear **12** and/or the base plate **46** may be rotated with respect to each other by a user to align the passages **24***a*, **24***b* of the gear **12** with the mounting holes **70***a*, **70***b*, respectively, of the base plate **46**. Moreover, the end **78** of the notch **66** may rest upon the shaft **14** of the motor. Furthermore, the length **74** of the notch **66** of the base plate **46** may be greater than a diameter **142** of the shaft **14**.

The face plate **50** may be attached to the gear **12** and/or the base plate **46**. The slots **106***a*, **106***b* of the face plate **50** may be aligned with the passages **24***a*, **24***b*, respectively, of the gear **12** and the mounting holes **70***a*, **70***b*, respectively, of the base plate **46**. Further, the face plate **50** may be connected and/or may be attached to the gear **12** and/or the base plate **46** by the fasteners **52***a*, **52***b*. The fasteners **52***a*, **52***b* may be inserted into the slots **106***a*, **106***b*, respectively, of the face plate **50**. As a result, the second end **122** and/or the threading **126** may extend outward with respect to the second side **102** of the face plate **50**. Still further, the second end **122** and/or the threading **126** of the fasteners **52***a*, **52***b* may be inserted into the passages **24***a*, **24***b* of the gear **12** and/or the mounting holes **70***a*, **70***b*, respectively, of the base plate **46**. As a result, the second end **122** and/or the threading

126 of each of the fasteners 52*a*, 52*b* may extend through each of the passages 24*a*, respectively, of the gear 12 and/or each of the mounting holes 70*a*, 70*b*, respectively, of the base plate 46. Still further, the second end 122 and/or the threading 126 of the fasteners 52*a*, 52*b* may engage the mounting holes 70*a*, 70*b*, respectively, and/or the threading within the mounting holes 70*a*, 70*b*, respectively, of the base plate 46. As a result, the face plate 50 may be attached to the base plate 46 such that the gear 12 and/or the thrust plate 38 is positioned between the face plate 50 and the base plate 46. The washers 130*a*, 130*b* may be positioned on the fasteners 52*a*, 52*b*, respectively. As a result, the washers 130*a*, 130*b* may be located between the first end 120 of the fasteners 52*a*, 52*b*, respectively, and the first side 100 of the face plate 50.

The press 54 may be attached to the apparatus 10 and/or the face plate 50 and the base plate 46. Further, the second end 134 and/or the threading 140 of the press 54 may be inserted into the central hole 110 of the face plate 50. As a result, the second end 134 and/or the threading 140 may extend outward with respect to the second side 102 of the face plate 50. The second end 134 and/or the threading 140 of the press 54 may engage the central hole 110 and/or the threading within the central hole 110 of the face plate 50. As a result, the press 54 may be attached to the face plate 50.

The press 54 may extend through the face plate 50 and/or the central hole 110. As a result, the second end 134 and/or the threading 140 of the press 54 may extend outward to a distance X from the second side 102 of the face plate 50. Further, the second end 134 of the press 54 may abut the shaft 14 and/or the second end 34 of the shaft 14. The press 54 and/or the threading 140 of the press 54 may be engaged to move the second end 134 outward a distance X'. As a result, the front side 56 of the base plate 46 may be pulled against the backside 42 of the thrust plate 38 and/or the backside 20 of the gear 12. Further, moving the second end 134 of the press 54 the distance X' may decrease the extended length 36 of the shaft 14 and/or may move the gear 12 outward with respect to the motor towards the second end 34 of the shaft 14. Still further, the gear 12 may be moved outward with respect to the motor towards the second end 34 of the shaft 14 according to the difference between the distance X and the distance X'.

The length 136 of the press 54 may be greater than the extended length 36 of the shaft 14. The first end 132 of the press 54 may move inward with respect to the first side 100 of the face plate 50. The difference between the distance X and the distance X' may increase as the length 136 of the press 54 extends outward with respect to the second side 102 of the face plate 50. Further, the difference between the distances X and X' may be greater than the extended length 36 of the shaft 14. As a result, the front side 56 of the base plate 46 and/or the fasteners 52*a*, 52*b* may pull the gear 12 and/or the backside 20 of the gear 12 inward with respect to the second end 34 of the shaft 14. Moreover, the front side 56 of the base plate 46 and/or the fasteners 52*a*, 52*b* may pull the gear inward with respect to the second side 102 of the face plate 50 beyond the second end 34 of the shaft 14. As a result, the gear 12 may be removed from the shaft 14.

The recession 68 in the front side 56 of the base plate 46 may pull the thrust plate 38 and/or the backside 42 of the thrust plate 38 inward with respect to the second end 34 of the shaft 14. The recession 68 of the front side 56 of the base plate 46 and/or the fasteners 52*a*, 52*b* may pull the thrust plate 38 and/or the backside 42 of the thrust plate 38 inward with respect to the second side 102 of the face plate 50 beyond the second end 34 of the shaft 14. Therefore, the gear 12 and/or the thrust plate 38 may be pulled from the second end 34 of the shaft 14 by the front side 56 of the base plate 46 and/or the recession 68 in the front side 56 of the base plate 46, respectively.

A user may connect the base plate 46 to the shaft 14 via the notch 66 in the base plate 46. The base plate 46 may be located between the backside 20 of the gear 12 and the first end 32 of the shaft 12. The user may pull the front side 56 of the base plate 46 to abut the backside 20 of the gear 12. The user may align the recession 68 on the front side 56 of the base plate 46 with the thrust plate 38. The backside 42 of the thrust plate 38 may abut the recession 68 of the base plate 46. As a result, the thrust plate 38 may be enclosed between the front side 56 of the base plate 46 and the backside 20 of the gear 12.

The user may insert the fasteners 52*a*, 52*b* into the slots 106*a*, 106*b*, respectively, of the face plate 50. As a result, the second ends 122 of the fasteners 52*a*, 52*b* may extend outward with respect to the second side 102 of the face plate 50. The user may align the fasteners 52*a*, 52*b* with the passages 24*a*, 24*b*, respectively, of the gear 12 and/or with the mounting holes 70*a*, 70*b*, respectively, of the base plate 46. The user may insert the fasteners 52*a*, 52*b* through the passages 24*a*, 24*b*, respectively, into the mounting holes 70*a*, 70*b*, respectively. The threading 126 of the fasteners 52*a*, 52*b* may engage the mounting holes 70*a*, 70*b*, respectively. As a result, the face plate 50 may be attached to the base plate 46 via the fasteners 52*a*, 52*b*. The user may apply, for example, a clockwise torque force to the fasteners 52*a*, 52*b* to secure the face plate 50 to the base plate 46. As a result, the base plate 46 may pull the face plate 50 inward with respect to the gear 12 and/or the shaft 14.

The user may insert the second end 134 of the press 54 into the central hole 110 of the face plate 50. The threading 140 of the second end 134 of the press 54 may engage the central hole 110 and/or may extend outward with respect to the second side 102 of the face plate 50. The user may exert, for example, a clockwise torque to the first end 132 of the press 54. As a result, the second end 134 of the press 54 may abut the second end 34 of the shaft 14. Further, the torque force may extend the second end 134 of the press 54 to the distance X from the second side 102 of the face plate 50. As a result, the face plate 50 may be pressed outward with respect to the second end 34 of the shaft 14. As a result, the base plate 46 and/or the gear 12 may be pulled inward with respect to the second end 34 of the shaft 14 by the press 54 and/or the face plate 50.

The user may apply a torque force to move the second end 134 of the press 54 to the distance X' from the second side 102 of the face plate 50. The distance X' may be greater than the extended length 36 between the second end 34 of the shaft 14 and the front side 18 of the gear. As a result, the base plate 46 and/or the gear 12 may be pulled from the second end 34 of the shaft 14. As a result, the gear 12 and/or the thrust plate 38 may be separated from the shaft 14.

It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications may be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is, therefore, intended that such changes and modifications be covered by the appended claims.

We claim:

1. An apparatus for separating a gear from a shaft having a first end and a second end opposite to the first end wherein the gear has a first side and a second side opposite to the first

side wherein the gear has a passage extending through the gear from the first side to the second side of the gear and further wherein the gear is between the first end and the second end of the shaft, the apparatus comprising:

a base plate having a notch, a front side and a backside opposite to the front side wherein the base plate has a first thickness between the front side of the base plate and the backside of the base plate wherein the base plate has edges defining the notch wherein the notch extends through the base plate from the front side of the base plate to the backside of the base plate and further wherein the notch is sized to receive the shaft between the first side of the gear and the first end of the shaft wherein the base plate has a second thickness which is adjacent to the edges of the base plate wherein the second thickness is less than the first thickness;

a face plate having a first side and a second side opposite to first side;

a first fastener that attaches the face plate to the base plate wherein the first fastener extends through the passage of the gear from the second side of the face plate to the front side of the base plate wherein the front side of the base plate abuts the first side of the gear; and

a press between the second side of the face plate and the second end of the shaft.

2. The apparatus of claim **1** further comprising:

a hole in the base plate.

3. The apparatus of claim **1** further comprising:

a handle attached to the base plate.

4. The apparatus of claim **1** further comprising:

a slot in the face plate.

5. The apparatus of claim **1** further comprising:

a recession surrounding the notch on the front side of the base plate.

6. The apparatus of claim **1** wherein the first fastener has a threading.

7. The apparatus of claim **1** wherein the press has a threading.

8. The apparatus of claim **1** further comprising:

a second fastener attaching the face plate to the base plate.

9. A system for separating a gear from a shaft wherein the gear has a passage extending through the gear wherein the gear has a first side and a second side opposite to the first side wherein the shaft has a first end and a second end opposite to the first end, the system comprising:

a base having a notch, a front side and a backside opposite to the front side wherein the base has a hole having a circumference defined by the base wherein the hole extends through the base from the front side of the base to the backside of the base wherein the notch extends through the base from the front side of the base to the backside of the base and further wherein the notch is sized to receive the shaft between the first side of the gear and the first end of the shaft; and

a pulling means connected to the base wherein the pulling means is adjacent to the gear wherein the pulling means extends through the passage of the gear into the hole of the base wherein the hole of the base is sized to receive the pulling means wherein the pulling means is attached to the base via the hole.

10. The system of claim **9** wherein the pulling means has a press abutting the second end of the shaft.

11. The system of claim **9** further comprising:

a fastener attaching the pulling means to the base via the passage of the gear.

12. The system of claim **9** further comprising:

a handle on the base.

13. The system of claim **9** further comprising:

a recession surrounding the notch on the front side of the base.

14. The system of claim **9** further comprising:

a plate enclosed between the first side of the gear and the front side of the base.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

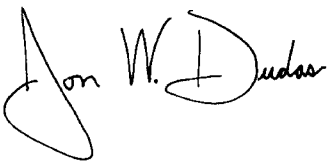
PATENT NO. : 7,328,501 B2
APPLICATION NO. : 10/850503
DATED : February 12, 2008
INVENTOR(S) : Smiley et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page and lines 1-2, item (54): Change "APPARATUS, A SYSTEM FOR SEPARATING A GEAR FROM A CAMSHAFT" to --APPARATUS, A SYSTEM AND A METHOD FOR SEPARATING A GEAR FROM A CAMSHAFT--

Signed and Sealed this

Ninth Day of September, 2008



JON W. DUDAS
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

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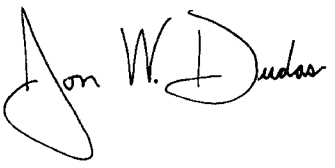
This certificate supersedes the Certificate of Correction issued September 9, 2008.

Signed and Sealed this

Thirtieth Day of September, 2008



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