

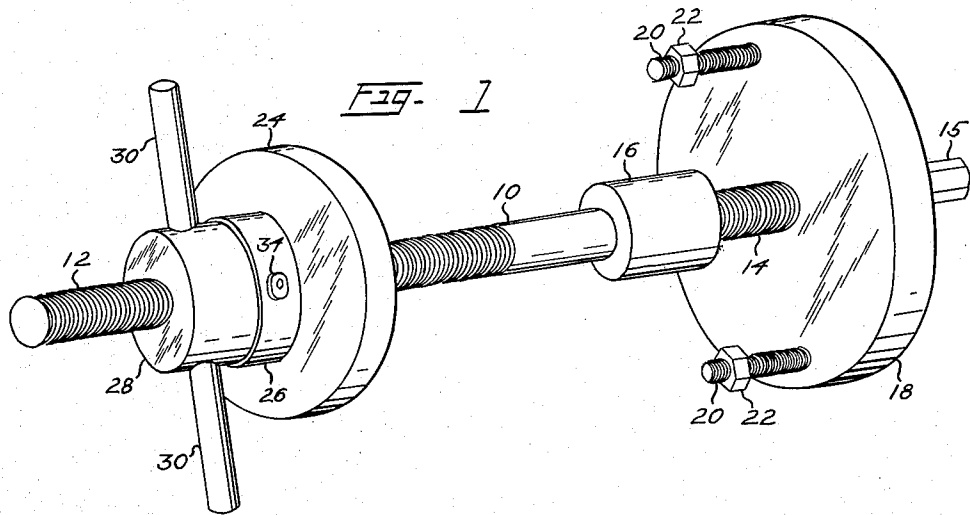
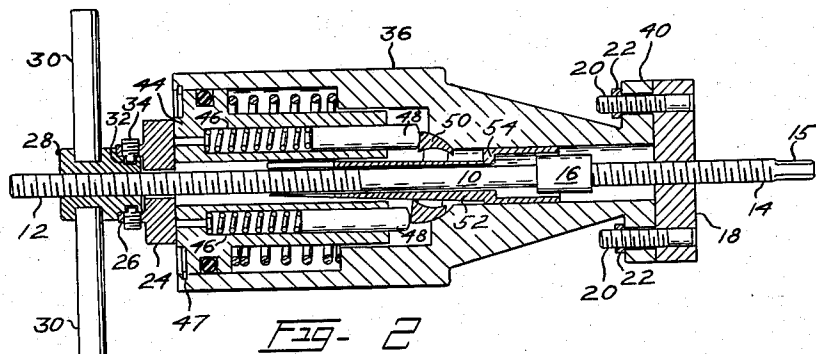
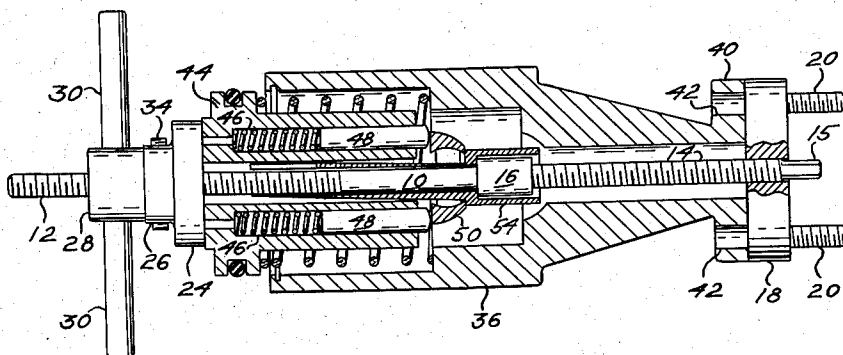
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ASSEMBLY TOOL

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ASSEMBLY TOOL

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3 Claims. (Cl. 29—214)

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This invention may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalties thereon.

This invention relates to a tool for disassembling and assembling a fuel injection pump and in particular for disassembling and assembling from and in the body of such pump of an inner block assembly of the type having a central bore and a plurality of parallel radially spaced cylinders with spring biased plungers therein, for example the fuel injection pump known as the Simmonds SU fuel injection pump.

In the past, removal of the plunger block assembly from the pump body was accomplished with the use of drift punches which often resulted in damage to the machined surfaces and to the plungers. In a fuel injection pump the plungers are spring biased. Prior methods of removal afforded no means for retaining the plungers in their cylinders when removing the assembly. On removal, the plungers were ejected entirely from their cylinders or became cocked in their cylinders their damaging them.

In reassembling the plunger block assembly, some elements were required to be replaced individually in the pump body thereby requiring a certain degree of skill and an excessive amount of time.

Accordingly, it is an object of this invention to provide a tool for assembling and disassembling a plunger block assembly with a pump body in a minimum of time without damaging any elements of the assembly.

It is another object of this invention to provide a tool which retains the plungers of the pump under compression while removing the plunger block assembly from the pump body.

It is a further object of this invention to provide a tool with which the entire plunger block assembly can be integrally replaced in the pump body without damage or loss of time.

Fig. 1 is a perspective view of the assembled tool.

Fig. 2 is a sectional view of the tool within the pump body prior to removal of the plunger block assembly.

Fig. 3 is a sectional view of the tool within the pump body in the stage of replacing the plunger block assembly.

Referring to Fig. 1, the tool comprises a shaft 10 having threaded end portions 12 and 14. One end of shaft 10 has a hexagonal head 15 so that the shaft can be rotated from this end by any conventional means such as a wrench. Plug or collar 16 is fixedly mounted on shaft 10 and acts as a thrust member as will be seen from the discussion below on the operation of the tool. Base backing member or disk 18 is threadedly mounted on shaft 10 on threads 14. Threaded studs 20 with cooperating nuts 22 are fixedly attached to disk 18. Compression collar 24 fits over shaft 10 on the end opposite disk 18. Feed nut 28 on threaded portion 12 of shaft 10 fits within boss 26 of collar 24. This nut 28 has a groove 32 (shown in Fig. 2) into which set screw 34 in boss 26 fits. Feed nut 28 is rotated by means of handle 30 fixed to nut 28.

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The pump itself which does not comprise any part of the invention is comprised of a pump body 36 having a base 40 with holes 42. Within the pump body 36 is a plunger block assembly comprising a plunger block 44 having cylindrical bores 46 within which reside spring biased plungers 48, a wobble plate 50 seated in body 36, and a Z shaft 52 having a piston portion 54. Snap ring 47 normally holds the assembly within the pump body.

10 Operation of the tool in removing the plunger block assembly from the pump body

Prior to using the tool, the pump is removed from the distributor block and housing which are not shown.

Disk 18 is rotated on shaft 10 on which collar 16 is attached. These elements are placed within the pump so that disk 18 rests against base 40 and studs 20 fit within holes 42. The disk 18 is then clamped to base 40 by means of nuts 22. If collar 16 is not seated against Z shaft 52 at this time, shaft 10 is rotated in disk 18 until collar 16 is seated. Compression collar 24 is placed over shaft 10 and nut 28 is screwed on threaded portion 12 of shaft 10 so that groove 32 fits in boss 26 of collar 24. Nut 28 is then screwed down until collar 24 pushes against plunger block 44 so that plungers 48 contacting wobble plate 50 are thereby compressed in cylinders 46. At this time all axial force on snap ring 47 is removed so that this ring can be easily removed. A wrench is then applied to head 15 and the shaft 10 is rotated. If collar 16 has not been previously seated against Z shaft 52, nut 28 must be held while shaft 10 is rotated until collar 16 is seated. As shaft 10 is rotated, the plug or collar 16 exerts an axial force on the piston portion 54 of Z shaft 52 and the wobble plate 50. This force acts on the entire plunger block assembly and forces such assembly out of the pump body 36. In this way collar 16 acts as a thrust member forcing out the plunger block assembly while collar 24 still retains the plungers 48 under compression.

Once the plunger block assembly is removed from the pump body, handle 30 is rotated counterclockwise slowly so that the tool can be disengaged from the plunger block assembly. In this way the compression on plungers 48 is slowly relieved, and the plungers cannot be suddenly ejected from the cylinders 46 thereby preventing any damage to the plungers. Nuts 22 are then unscrewed from studs 20 so that disk 18 can be removed. This leaves the various elements of the pump accessible for any further operations such as repairs or cleaning.

50 Operation of the tool in replacing the plunger block assembly in the pump body

When it is desired to replace the plunger block assembly in pump body 36, the shaft 10 with thrust collar 16 is inserted, collar 24 is placed on the shaft 10 and nut 28 screwed down so as to compress the plungers 48 in the cylinders 46 against wobble plate 50. The entire assembly is then placed in the pump body so that hex head 15 protrudes past the base 40 of pump body 36 and disk 18 is screwed on to threaded portion 14 of shaft 10 as shown in Fig. 3. Disk 18 is then rotated thereby acting as a nut and pulling the shaft 10 and thereby the remaining elements into position within the body 36. Since the plungers 48 are under compression, snap ring 47 is easily inserted. Then feed nut 28 can be unscrewed from shaft 10 thereby removing collar 24. Shaft 10, collar 16 and disk 18 can then be withdrawn since the snap ring 47 will hold the plunger block assembly in pump body 36. The pump can then be connected to the housing and distributor block. In this way the assembly is replaced as an integral unit very simply and quickly without requiring any unusual degree of skill.

I claim:

1. A tool for the removing from and replacing in a fuel injection pump body, connectable at one end thereof to a distributor block and at the other end thereof to a housing, of a spring biased plunger block assembly having a central aperture therethrough with actuating means positioned in said block assembly toward one end thereof positionally corresponding to said one end of said body and with releasable retaining means positioned on said block assembly at the other end thereof positionally corresponding to said other end of said body, said tool comprising, in combination, a shaft adapted to be operatively inserted through said aperture, a head formed on one end of said shaft to enable manually forced rotation thereof, said shaft extending toward said one end thereof in a first threaded portion and extending toward the other end thereof in a second threaded portion, a pump body backing member threadedly mounted on said first threaded portion, engaging means on the side of said backing member facing said second threaded portion adapted during operation of said tool to fixedly engage said backing member thereof to said pump body at said one end thereof, a feed nut threadedly mounted on said second threaded portion toward said other end of said shaft, a compression member slidably mounted on said shaft between said feed nut and backing member and having one side facing the latter adapted during operation of said tool to contact said block assembly on said other end thereof, engaging means on the other side of said compression member for fixedly engaging the latter to said feed nut, and a rigid thrust member fixedly mounted on said shaft between said first and second threaded portions and between said backing and compression members, said thrust member during operation of said tool being adapted to be inserted with said shaft in said aperture for application of pressure to said plunger actuating means.

2. A tool as set forth in claim 1 including manual rotation means on said feed nut.

3. A tool for the removing from and replacing in a fuel injection pump body, connectable at one end thereof to a distributor block and at the other end thereof to a

housing, of a spring biased plunger block assembly having a central aperture therethrough with plunger actuating means positioned in said block assembly toward one end thereof positionally corresponding to said one end of said body and with releasable retaining means positioned on said block assembly at the other end thereof positionally corresponding to said other end of said body, said tool comprising, in combination, a shaft adapted to be operatively inserted through said aperture, a head formed on one end of said shaft to enable manually forced rotation thereof, said shaft extending toward said one end thereof in a first threaded portion and extending toward the other end thereof in a second threaded portion, a pump body backing disk threadedly mounted on said first threaded portion, engaging means on the side of said backing disk facing said second threaded portion adapted during operation of said tool to fixedly engage said backing disk to said pump body at said one end thereof, a feed nut threadedly mounted on said second threaded portion toward said other end of said shaft, a handle on said feed nut for manually turning the latter, a compression collar slidably mounted on said shaft between said feed nut and backing disk and having one side facing the latter adapted during operation of said tool to pressingly engage said block assembly on said other end thereof, mutually engageable locking means on the other side of said compression collar and on said feed nut, and a rigid thrust collar fixedly mounted on said shaft between said first and second threaded portions and between said backing disk and compression collar, said thrust collar during operation of said tool being adapted to be inserted with said shaft in said aperture for application of pressure to said plunger actuating means.

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