United States Patent

[11] 3,584,633

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[21] Appl. No. **798,700**
[22] Filed **Feb. 12, 1969**
[45] Patented **June 15, 1971**

[54] **ASSEMBLY FOR REVERSE FLUSHING AUTOMOTIVE TYPE TORQUE CONVERTERS**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **134/104,** 134/111, 134/116, 134/140, 134/169
[51] **Int. Cl.** **B08b 3/04,** B08b 9/00
[50] **Field of Search** ..... 134/109, 110, 111, 116, 140, 166, 169, 169 A, 104

[56] **References Cited**

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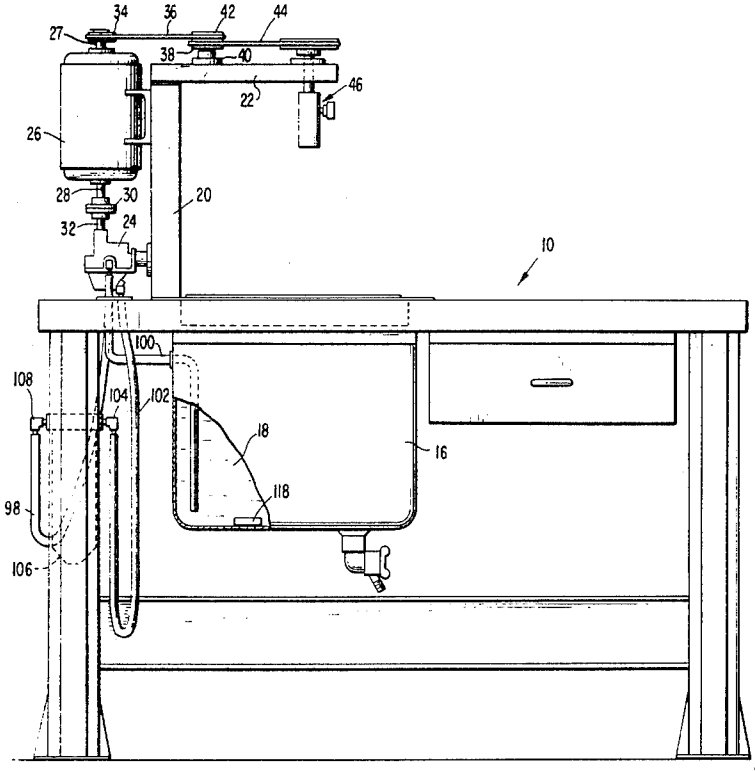
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ABSTRACT: The turbine of an automotive torque converter is rotated while its casing is held stationary and solvent is introduced into the converter, thereby to effect a reverse flushing action to remove deposit and potentially injurious particles from the interior of the converter. An adapter fits over and seals upon the converter hub and the upper end of the adapter is provided with a sealed bearing journaling the splined turbine drive shaft, solvent being introduced into the converter through the adapter. An overhead drive is provided for the turbine drive shaft and a single motor is used simultaneously to drive the turbine shaft and a pump for circulating the solvent.



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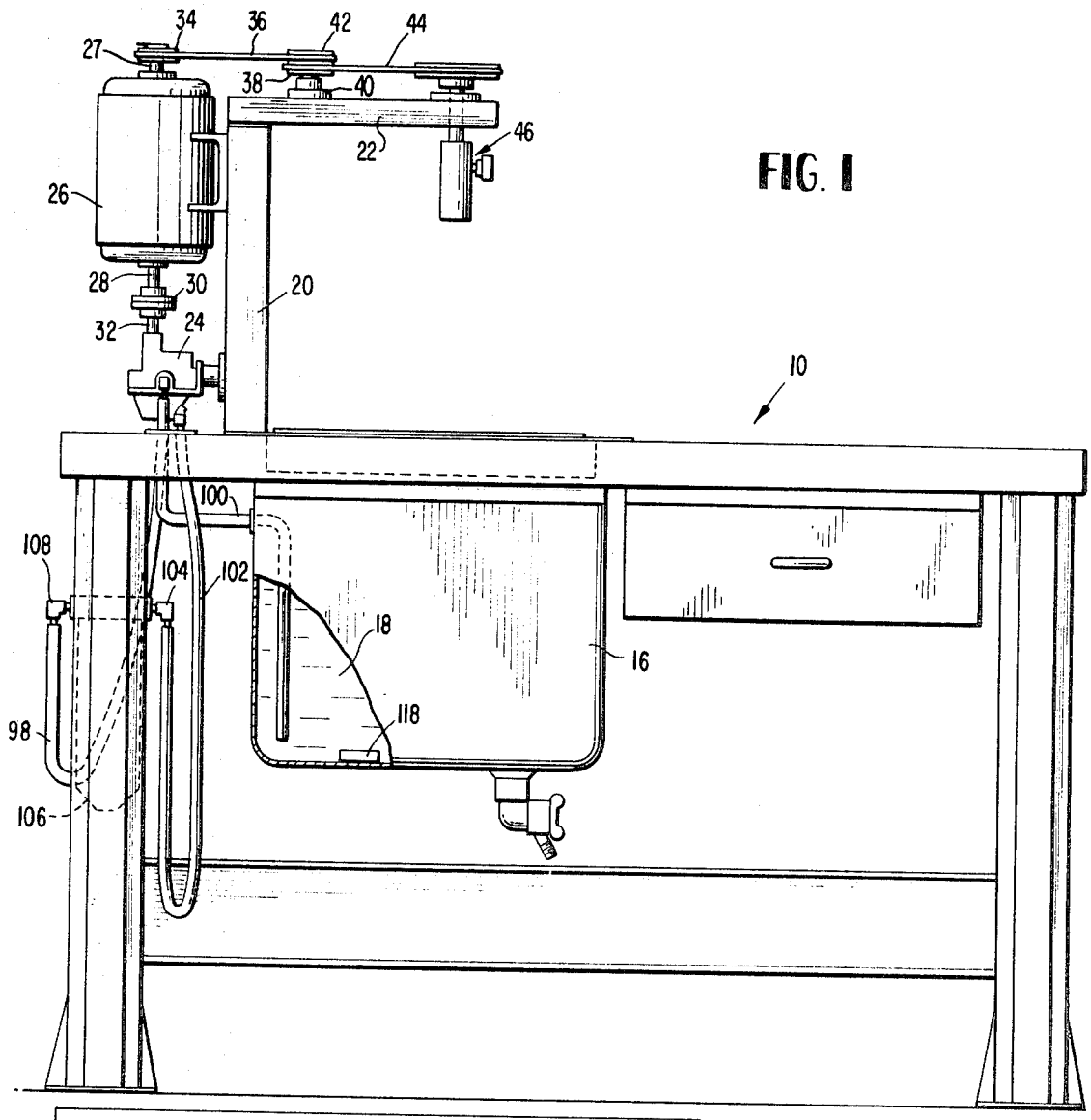


FIG. 1

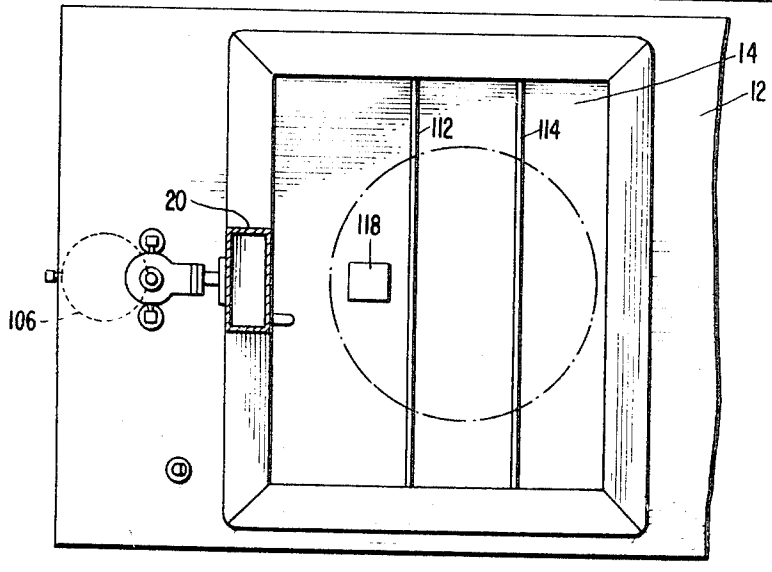


FIG. 2

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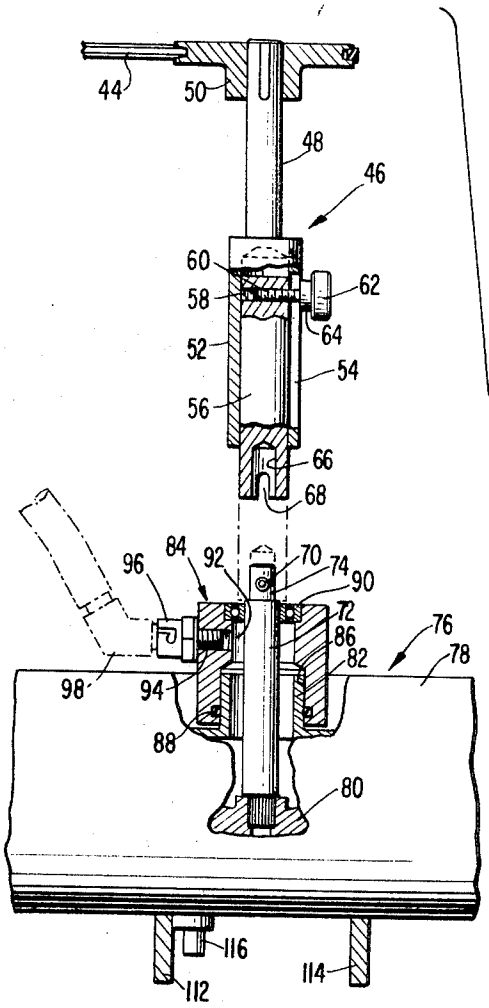


FIG. 3

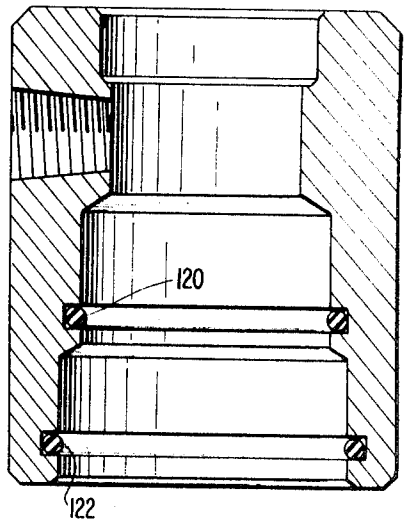


FIG. 4

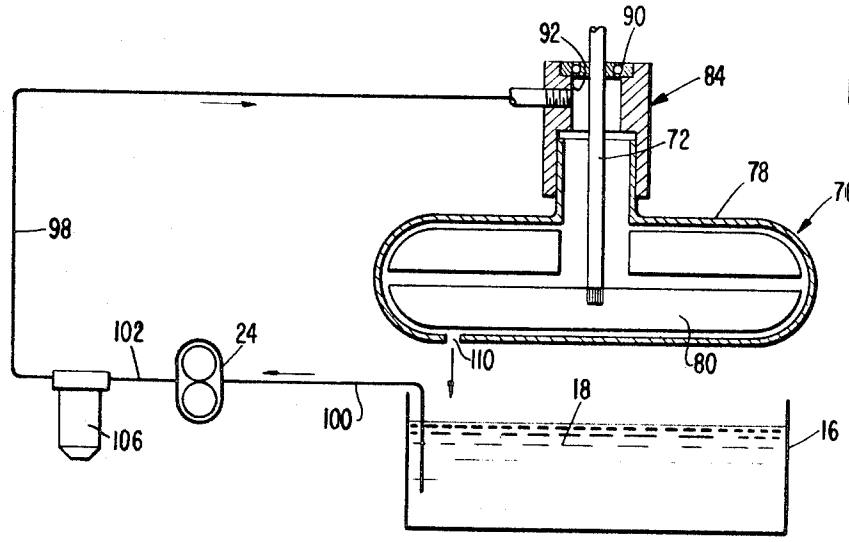


FIG. 5

ASSEMBLY FOR REVERSE FLUSHING AUTOMOTIVE TYPE TORQUE CONVERTERS

BACKGROUND OF THE INVENTION

Prior art devices have been provided for the purpose of cleaning automatic transmission torque converters and in connection with this the utilization of a reverse flow type of flushing action has been contemplated. An example of this type of apparatus is shown in U.S. Pat. No. 3,103,937 wherein a motor driven pump circulates the solvent fluid to the torque converter in position to drain the solvent therefrom into a suitable supply receptacle, the fixture being provided with an electric drive motor coupled to a drive shaft for rotating the converter turbine while the solvent is passing through the converter casing. The normal direction of fluid flow within a converter is reversed by this action and it has been found that by recirculating the solvent fluid in connection with suitable filtering means very effectively removes deposits from the interior of the converter while flushing out same together with any potentially injurious particles which may be lodged within the interior of the converter casing.

Assemblies of the prior art have tended to be relatively expensive not only as to their initial cost but also require considerable amount of time to set up and remove the converter being operated upon.

BRIEF SUMMARY OF THE INVENTION

It is accordingly, of primary concern in connection with the present invention to provide an improved form of torque converter reverse flow flushing assembly which minimizes the set up and removal time required and which also is so constructed and arranged as to minimize the manufacturing and initial cost of the assembly.

More particularly, the present invention is concerned with a flushing assembly as described which includes a frame provided with a well or receptacle for the solvent fluid, a pump, and drive means for one of various turbine drive shafts. The turbine drive shaft is journaled in an adapter which fits over the converter hub and seals thereagainst with the space between the seal and the bearing for the turbine drive shaft defining a chamber into which the solvent fluid is introduced by the pump. A single drive motor is provided which simultaneously actuates the drive means and the pump.

The drive means is provided with an axially extensible coupling for establishing rotational drive to the turbine drive shaft and which may be shifted upwardly to disable the drive and allow the converter mechanism to be removed. A simple grate arrangement simultaneously supports the converter assembly while establishing abutment means for holding the converter casing stationary during the flushing operation.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a side elevational view, partly in section, illustrating an embodiment of the invention;

FIG. 2 is a partial plan view, partly in section, illustrating certain details of the assembly shown in FIG. 1;

FIG. 3 is an enlarged sectional view showing components of the drive and adapter mechanisms;

FIG. 4 is an enlarged longitudinal section taken through a modified form of adapter; and

FIG. 5 is a diagrammatic view illustrating the operative components of the system in association with a diagrammatically illustrated torque converter.

DETAILED DESCRIPTION OF THE INVENTION

With reference at this time more particularly to FIG. 1, the illustrative embodiment shown therein will be seen to include a frame indicated generally by the reference character 10 and which may be generally in the form of a table or bench area 12 as indicated in FIG. 2 provided with an opening 14 with which a receptacle 16 is aligned to define a well for receiving a supply of solvent as indicated by the reference character 18. The table or frame 10 is, of course, provided with suitable supporting legs and any requisite or necessary bracing, substantially as is shown.

The frame of the assembly is provided with an upright or post 20 having a horizontally disposed overhanging arm 22 at its upper end, the arm overlying and being disposed above the fluid solvent supply well. A pump 24 is mounted on the upright 20, substantially as is shown and disposed in fixed relationship above this pump is an electric motor 26 having its drive shaft projecting from its opposite ends as indicated by the reference characters 27 and 28. The lower end extension 28 is coupled by a suitable coupling device as, for example, a self-aligning or resilient coupling member 30 to the shaft 32 of the pump 24. The upper drive shaft portion 27, on the other hand, is provided with a drive pulley 34 over which a belt 36 is trained drivingly connecting the motor to the idler or intermediate shaft 38 suitably journaled on the arm 22 as by the bearing mount 40. The intermediate shaft 38 has a double pulley arrangement 42, one of which pulleys receives the belt 36 and the other of which receives a belt 44 for effecting rotation of the drive means indicated generally by the reference character 46. The drive means 46, as is best shown in FIG. 3, includes the driven shaft 48 to which is keyed the pulley 50 over which the belt 44 is trained and the lower end of the driven shaft 48 is provided with an elongate tubular, sleevelike extension 52, the same having an elongate slot 54 extending axially thereof. A drive coupling shaft 56 is slideably received within the sleeve extension 52 for axial displacements relative thereto and the extension or coupling shaft 56 is provided with a threaded transverse bore 58 receiving the threaded element 60 having the enlarged hand knob portion 62 and the stop shoulder portion 64 adapted to bear against the surface of the sleeve 52 so as to fix the drive coupling shaft 56 in desired axially positioned relation with respect to the sleeve 52. The lower end of the coupling shaft 56 is provided with a recess 66 and this portion of the shaft is provided with diametrically opposed notches 68 which receive the opposite ends of a cross pin 70 fixed to the upper end of the turbine drive shaft 72 as shown in FIG. 3 when the drive coupling shaft 56 has been lowered or extended axially downwardly with respect to the sleeve 52 so as to encompass the upper end portion 74 of the shaft 72.

FIG. 3 also shows a portion of the torque converter assembly 76 upon which the flushing action is to be effected. Although the converter 76 may, of course, take many different configurations according to the type of automotive vehicle with which it is associated, same will include a casing or housing 78 within which a turbine portion 80 is rotatably disposed and which is adapted normally to be coupled with the main shaft of the automatic transmission with which it is associated, it being appreciated that the casing 78 is directly attached to or forms the flywheel assembly for the associated internal combustion engine.

The casing 78 is provided with a hub portion 82 which receives the adapter assembly indicated generally by the reference character 84. The adapter assembly 84 is in the form of a sleeve having an enlarged counterbore 86 at one end receiving the converter hub 82 in loosely sliding relationship, the counterbore 86 being provided with an internal groove receiving an O-ring sealing member 88 which effectively seals around the converter hub 82, substantially as is shown in FIG. 3. The upper end of the adapter 84 receives a double seal ball bearing 90 which rotatably supports the turbine drive shaft 72 and, being sealed, effects in combination with the O-ring seal 88 a chamber 92 leading into the interior of the casing 78 through the converter hub 82 and into which chamber 92 the solvent fluid is adapted to be supplied. For this purpose, the adapter 84 is provided with a threaded bore 94 leading to the chamber 92 and which receives a quick disconnect nipple member 96 of any conventional form by means of which the free end of the pump outlet conduit 98 is adapted quickly to be connected and disconnected as will be well understood by those skilled in the art.

Referring to FIG. 1, the pump 24 is provided with an inlet conduit 100 which leads into the solvent supply 18 and a flexible conduit 102 leads from the outlet of the pump to the inlet nipple 104 of the filter element or body 106, such filter having an outlet nipple 108 to which the aforesaid flexible pump conduit 98 is attached. The schematic operation of the system is shown in FIG. 5. As illustrated, the casing 78 of the converter 76 is provided with a drain opening 110 and while the shaft 27 drives the turbine 80 relatively to the fixed casing 78, the solvent liquid is introduced into the chamber 92 and thusly into the interior of the casing 78 whereby the reverse flow flushing is achieved.

A particular feature of the present invention resides in the arrangement whereby a single motor operates both the pump and the drive for the converter turbine and also in the disposition of component parts such that the drive means 46 is so arranged and cooperates in such fashion with the adapter-turbine drive shaft assembly that the torque converter is readily and easily connected and disconnected to the lubricant supply and turbine drive entities. By providing a pair of relatively narrow bars 112 and 114, as shown in FIG. 2, across the opening of the solvent supply well, the converter 76 simply placed directly upon this grate and is sufficiently well supported thereby as to prevent rotation of the casing 78 in response to rotational movement of the turbine 80. This action is enhanced by virtue of the fact that several mounting projections 116 are invariably employed in connection with the casing 78 which will abut the bars 112 and 114 and prevent rotation of the casing as may be evident more clearly in FIG. 3.

The adapter-shaft assembly 84, 72 very readily and quickly slips over the hub 82 with the shaft 72 engaged with the turbine 80 while the coupling shaft 56 is withdrawn to its upper position as shown in full lines in FIG. 3, whereafter the hand knob 62 is manipulated to allow the shaft 56 to be drivingly connected to the upper end of the shaft 72 whereafter the hand knob 62 is once again tightened. The pump outlet conduit 98 is then coupled to the nipple 96 and the device is ready for the flushing operation, the mere reversal of the above procedure quickly and easily effecting removal of the cleansed converter assembly 76. As is shown in FIGS. 1 and 2, the bottom of the reservoir 16 may be provided with a block of magnetic material 118 to collect and hold metallic particles which may be flushed from the interior of the torque converter casing.

As has been stated hereinbefore, there are many different forms of torque converters and to accommodate for this fact, a number of adapter-shaft arrangements 84, 72 are provided, each adapting the system to a particular type of torque converter, one such adapter being illustrated in FIG. 4. for receiving a stepped converter hub and being provided with two seal members 120 and 122 to be engaged therearound. In all other respects, it will be understood that the adapter or FIG. 4 is identical in construction and operation with that described in conjunction with FIG. 3.

What I claim as invention is:

1. A machine for cleansing automotive-type torque converters, comprising in combination,

a frame having a well for receiving a supply of solvent liquid and including a support over said well upon which a torque converter may be disposed, said frame including an overhead support having a portion overlying and spaced above said well,

drive means carried by said overhead support and including a coupling shaft axially shiftable toward and away from a torque converter supported on said frame over said well,

pump means for circulating solvent liquid,

means for driving said pump means and said drive means,

an adapter assembly including a sleeve adapted to slip over the hub of a torque converter and a turbine drive shaft adapted to be driven by said coupling shaft, a seal carried by one end of said sleeve for engaging around the torque converter hub, bearing means adjacent the other end of said sleeve journaling said turbine drive shaft coaxially of said sleeve and defining with said seal, a chamber communicating with the interior of the torque converter through the hub thereof,

and conduit means connecting said pump means to said well and said chamber for recycling solvent liquid from said well to said chamber.

2. The machine as defined in claim 1 wherein said means for driving comprises a single motor mounted on said overhead support and having a vertically disposed drive shaft, said pump being mounted on said overhead support in alignment with said drive shaft on the motor and connected to one end thereof, said coupling shaft being disposed in spaced parallelism with said drive shaft and connected to the other end thereof.

3. The machine according to claim 2 wherein said drive means includes a vertical driven shaft having a tubular lower end portion, said coupling shaft being axially slidable within said tubular portion, and means for fixing said coupling shaft in selectively extended positions with respect to said tubular portion.

4. The machine according to claim 3 wherein the upper end of said turbine drive shaft and the lower end of said coupling shaft are adapted for male-female driving engagement.

5. The machine according to claim 4 wherein said conduit means includes a filter for removing solid material from said solvent liquid.

6. A machine for cleansing automotive-type torque converters, comprising in combination,

a well for receiving a supply of solvent liquid and including a support over said well upon which a torque converter may be disposed,

drive means positioned above said well and including a coupling shaft axially shiftable toward and away from a torque converter supported over said well,

pump means for circulating solvent liquid,

means, comprising a single motor, for driving said pump means and said drive means,

an adapter assembly including a sleeve adapted to slip over the hub of a torque converter in sealed relation and a turbine drive shaft adapted to be driven by said coupling shaft,

and conduit means connecting said pump means to said well for recycling solvent liquid from said well to said converter,

said drive means including a vertical driven shaft having a tubular lower end portion, said coupling shaft being axially slidable within said tubular portion, and means for fixing said coupling shaft in selectively extended positions with respect to said tubular portion.

7. The machine according to claim 6 wherein the upper end of said turbine drive shaft and the lower end of said coupling shaft are adapted for driving engagement.

8. The machine according to claim 7 wherein said conduit means includes a filter for removing solid material from said solvent liquid and said well includes a magnetic trap for restricting foreign material from entering said conduit means.