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(74) Agent: MACRAE & CO.; P.O. Box 806, Station B, Ottawa, Ontario K1P 5T4 (CA).

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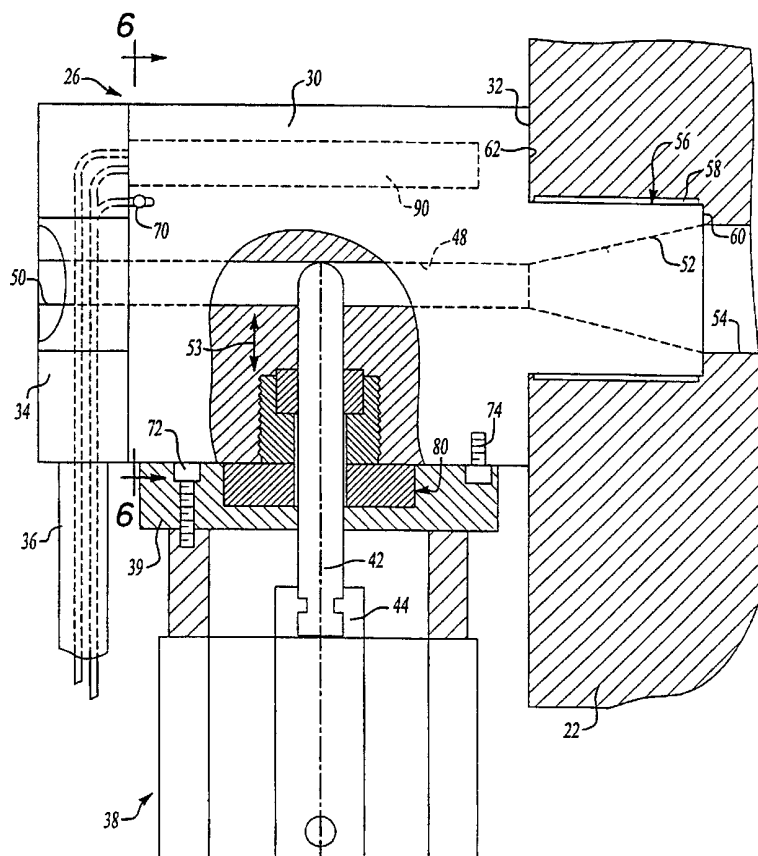
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(71) Applicant: SIEMENS CANADA LIMITED [CA/CA];
16 Industrial Park Road, Tilbury, Ontario N0P 2L0 (CA).

(72) Inventor: JACOBS, John; 1403 Road 2 Mersea, Leamington, Ontario N8H 3V7 (CA).

(54) Title: INLET SHUT-OFF BUSHING FOR USE WITH PLASTIC MOLD MACHINES



(57) Abstract: An inlet shut-off bushing (26) for a plastic mold machine includes a threaded connection that seals off the interface between the bushing and the mold. A threaded portion (56) of the bushing is received within the mold so that two surfaces simultaneously bottom out against corresponding surfaces on the mold, thereby sealing off the interface between the bushing and the mold. The bushing body houses heater elements (90) and other components in a manner that isolates them from contaminants or any possible leaking plastic within the assembly.

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**INLET SHUT-OFF BUSHING FOR
USE WITH PLASTIC MOLD MACHINES**

BACKGROUND OF THE INVENTION

5 This invention generally relates to controlling plastic flow into a plastic mold machine. More particularly, this invention relates to an inlet shut-off bushing for controlling plastic flow in a plastic mold machine.

 Plastic molding has been widely used in a variety of industries. One particular application is making components or parts for automotive vehicles.

10 One challenge that is presented is adequately controlling the flow of plastic material into a mold during the manufacturing process. Conventional arrangements include shut-off bushings to couple a source of plastic material with the mold. Conventional shut-off bushings have various shortcomings and drawbacks. A primary shortcoming of conventional arrangements is that they do not provide adequate seals to
15 keep melted plastic material from flowing outside of the mold machine assembly or into portions of the assembly where the plastic material causes damage to other components. The interface between a shut-off bushing and the mold has proven to be a primary location for undesirable leaks. Conventional attachment strategies do not provide sufficient sealing to keep plastic from leaking outside of the mold at the
20 interface between the inlet bushing and the mold.

 Another shortcoming of conventional arrangements is that the various components associated with the shut-off bushing are exposed to potential contaminants including, but not limited to melted plastic that leaks outside of a desired location in the assembly. This causes a sufficient down time problem where a machine must be
25 shut down and repairs or replacements made because one or more components have been exposed to melted plastic material, which hinders the operation of the machine or renders it inoperative.

 There is a need for an improved arrangement for communicating melted plastic into a mold. This invention addresses that need while avoiding the shortcomings and
30 drawbacks of the prior art described above.

SUMMARY OF THE INVENTION

In general terms, this invention is a molding machine for making items from plastic material. The inventive machine includes a mold that has an inlet adapted to receive plastic material. A supply of plastic material is coupled to the mold through a bushing. The bushing has a threaded portion that is received by the mold at the inlet of the mold such that the interface between the mold and the bushing is sealed when the bushing is mounted to the mold.

In a preferred embodiment, the bushing includes a threaded portion that bottoms out on a corresponding surface on the mold at the same time that a second portion of the bushing bottoms out against another portion of the mold. When the two surfaces bottom out simultaneously, the interface between the mold and the bushing is effectively sealed to prevent any plastic material from leaking at the interface.

Another advantageous feature of this invention is that heating elements are supported within a body portion of the bushing so that the heating elements are isolated from any melted plastic material or other contaminants in the area of the bushing. Similarly, all electrical connections to the heating elements preferably are encased and isolated from the flow of plastic material, which sufficiently reduces machine down time.

The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 schematically illustrates a machine designed according to this invention.

Figure 2 is a perspective illustration of a bushing and mold designed according to this invention.

Figure 3 is a partial cross-sectional view taken along the lines 3-3 in Figure 2.

Figure 4 is a partial cross-sectional view showing selected components of Figure 3.

Figure 5 shows selected components of the arrangement of Figure 4.

Figure 6 is a cross-sectional view taken along the lines 6-6 in Figure 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A molding machine 20 for making items from plastic material includes a mold
5 22. The mold preferably includes a contoured surface that dictates the shape of the parts to be made. A supply of plastic 24 provides the plastic material to the mold 22 through a inlet shut-off bushing 26. The plastic supply 24 and mold 22 are conventional, except as may be described below.

The bushing 26 includes a body 30 that is preferably is made from steel. One
10 end 32 of the body 30 is received against the mold 22. An opposite end of the body 30 includes a cover 34 that facilitates coupling electrical connections 36 to other components within the bushing as will be described below.

A support structure 38 is attached to a mounting plate 39, which is secured to the body 30. A hydraulic arrangement 40 operates to move a shut-off pin 42 in a radial
15 direction relative to the housing 30. The preferred arrangement includes a yoke 44 to facilitate the hydraulics moving the pin 42 in the desired manner.

The pin 42 preferably is moved into and out of a flow passage 48 that extends between an inlet 50 and an outlet 52. The shut-off pin 42 preferably is moved as shown by the arrows 53 in Figure 3 for example. In the illustrated embodiment, the
20 flow passage 48 extends axially through the body 30. The hydraulic arrangement moves the pin 42 in a radial direction into or out of the flow passage 48 to control the flow of plastic material to the mold inlet 54.

The bushing 26 preferably includes a threaded portion 56 that is received within the mold 22. The threaded portion 56 preferably has a reduced outside
25 dimension relative to an adjacent portion of the body 30. A plurality of threads 58 preferably are timed so that a terminal surface 60 on the threaded portion 56 bottoms out against a corresponding surface on the mold 22. In the preferred embodiment, the adjacent portion of the body 30 has a surface 62 that bottoms out against a corresponding surface on the mold 22 at the same time that the thermal surface 60
30 bottoms out against the mold. The timing of the threads 58 preferably provides for the simultaneous abutment between the surfaces described above to effectively seal off the interface between the mold 22 and the bushing 26. This arrangement is superior to

prior attempts at preventing leaks at the interface between the mold and the bushing.

The various components of the bushing 26, including the body 30, the cover 34 and the mounting plate 39 preferably are made from hardened steel. The cover 34 is secured to the body 30 using set screws 70. Similarly, the mounting plate 39
5 preferably is secured to the body 30 using set screws 72 and 74. Other fastening arrangements are possible although set screws are preferred so that the cover 34 and mounting plate 39, for example can be selectively removed from the body as may be needed over time.

As best seen in Figures 4 and 5, a bushing 80 preferably supports the shut-off
10 pin 42 such that the pin 42 is moveable relative to the body 30 to selectively close off the flow of plastic within the passage 48. The bushing 80 preferably includes a threaded portion 82 that resembles the threaded portion 56 of the body 30. Threads 84 preferably are timed so that a terminal surface 86 bottoms out against a corresponding surface on the body 30. In the illustrated example, a separate bushing element 88 is
15 provided that receives the pin 42 while the bushing 88 is received within the bushing 80. In another example, the bushing portions 80 and 88 are integrated into a single component. The bushing 80 insures that plastic does not leak out around the edges of the shut-off pin 42.

Another advantageous feature of this invention is that all operative components
20 that may be affected by leaking plastic material are isolated from the flow of plastic through the bushing. For example, a plurality of heater elements 90, which preferably are conventional heater rods, are supported within the body 30 and isolated from the flow of plastic material. Additionally, the cover 34 isolates all electrical connections 36 to the heater elements 90 so that any plastic that may leak within the assembly does
25 not come into contact with the heater elements or any electrical connections. By isolating these components from potential leaking plastic material, the inventive arrangement provides a more robust system that is not subject to machine down time or necessary repairs that accompanied prior arrangements.

This invention provides a significant improvement in arrangements for
30 coupling a plastic supply to a plastic mold in a plastic molding machine assembly. Superior sealing characteristics and machine durability are provided by the inventive arrangement.

The preceding description is exemplary rather than limiting in nature. Variations and modifications to the disclosed embodiment may become apparent to those skilled in the art that do not necessarily depart from the purview and spirit of this invention. The scope of legal protection given to this invention can only be

5 determined by studying the following claims.

CLAIMS

1. A molding machine for making items from plastic material,
comprising:
- 5 a mold having an inlet adapted to receive the plastic material;
a supply of plastic material; and
a bushing coupling the supply to the mold and having a threaded
portion that is received by the mold at the inlet such that an interface between the
mold and the bushing is sealed.
- 10
2. The machine of claim 1, wherein the threaded portion includes a
nominal outside dimension and an adjacent portion of the bushing threads has a
larger dimension and wherein the adjacent portion of the bushing is received directly
against a corresponding portion of the mold when the threaded portion is completely
15 received by the mold.
3. The machine of claim 2, wherein the threaded portion is threaded
such that a terminal end on the threaded portion bottoms out on a corresponding
surface on the mold at the same time that the adjacent portion of the bushing
20 bottoms out against the corresponding portion of the mold.
4. The machine of claim 3, wherein the mold includes corresponding
threads that cooperate with the threads on the bushing threaded portion.
- 25
5. The machine of claim 1, wherein the bushing includes a plurality of
heating elements supported in a body portion of the bushing.
6. The machine of claim 5, wherein the heating elements comprise
heater rods encased in the body portion of the bushing such that the heater rods are
30 isolated from any plastic material within the bushing.

7. The machine of claim 1, wherein the bushing includes an inlet at a first end of the bushing adjacent the supply and an outlet at a second end adjacent the mold inlet and including a cover element near the bushing inlet, the cover encasing all electrical connections to components supported by the bushing.

5

8. The machine of claim 1, wherein the bushing includes an inlet at a first end of the bushing adjacent the supply and an outlet at a second end adjacent the mold inlet and including a shut-off pin supported for movement at least partially within the bushing to selectively stop a flow of plastic material from the bushing inlet to the bushing outlet to thereby control a flow of the plastic material into the mold.

10

9. The machine of claim 8, wherein the bushing inlet and outlet are at opposite ends of an axial passage through a housing of the bushing, the shut-off pin is selectively moveable in a radial direction relative to the bushing housing into a position to block the axial passage, a portion of the shut-off pin extends radially out of the bushing and the bushing includes a plate portion secured to an outer surface on the bushing surrounding the portion of the pin that extends out of the bushing.

15

10. A device for controlling the flow of plastic into a plastic mold having an inlet port, comprising:

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a bushing body having a first end with an inlet to receive plastic material and an outlet at a second end that is adapted to communicate the plastic material into the mold inlet port, the body including a threaded portion near the second end that is received near the inlet port of the mold such that the threaded connection operates to seal off an interface between the body and the mold.

25

11. The device of claim 10, wherein the threaded connection includes threads on an extension portion of the body that has a nominal outside dimension and an adjacent portion of the body has a larger outside dimension, the adjacent portion of the body being adapted to be received directly against a corresponding surface on the mold to thereby seal off the interface between the body and the mold.

30

12. The device of claim 11, wherein the threaded portion is threaded such that a terminal end on the threaded portion bottoms out on a corresponding surface on the mold at the same time that the adjacent portion of the bushing bottoms out against the corresponding portion of the mold.

5

13. The device of claim 10, including a plurality of heating elements supported in the body such that the heating elements are isolated from any plastic material within the bushing.

10 14. The device of claim 10, wherein the bushing body includes an inlet at a first end of and an outlet at a second end and including a cover element near the bushing inlet, the cover encasing all electrical connections to components supported by the bushing.

15 15. The device of claim 14, wherein the bushing inlet and outlet are at opposite ends of an axial passage through the body and including a shut-off pin that is selectively moveable in a radial direction relative to the body into a position to block the axial passage, a portion of the shut-off pin extends radially out of the bushing and the bushing includes a plate portion secured to an outer surface on the
20 bushing surrounding the portion of the pin that extends out of the bushing.

16. A bushing for coupling a plastic supply to a plastic mold machine, comprising:
a housing portion having an inlet and an outlet at opposite ends of a
25 passage through the housing and a plurality of heating elements supported within the housing portion such that the heating elements are isolated from the plastic material that passes through the passage.

17. The bushing of claim 16, wherein the heating elements are
30 electrically powered and including a cover near the bushing inlet that covers over all electrical connections to the heating elements.

18. A device for controlling the flow of plastic into a plastic mold having an inlet port, comprising:

5 a bushing body having a first end with an inlet to receive plastic material and an outlet at a second end that is adapted to communicate the plastic material into the mold inlet port, the body including a plurality of heating elements supported within the body and isolated from the plastic material that passes through the body.

10 19. The device of claim 18, wherein the heating elements are completely encased in the material from which the body is made.

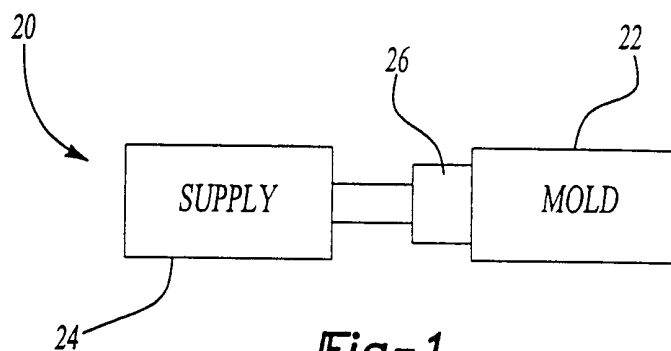


Fig-1

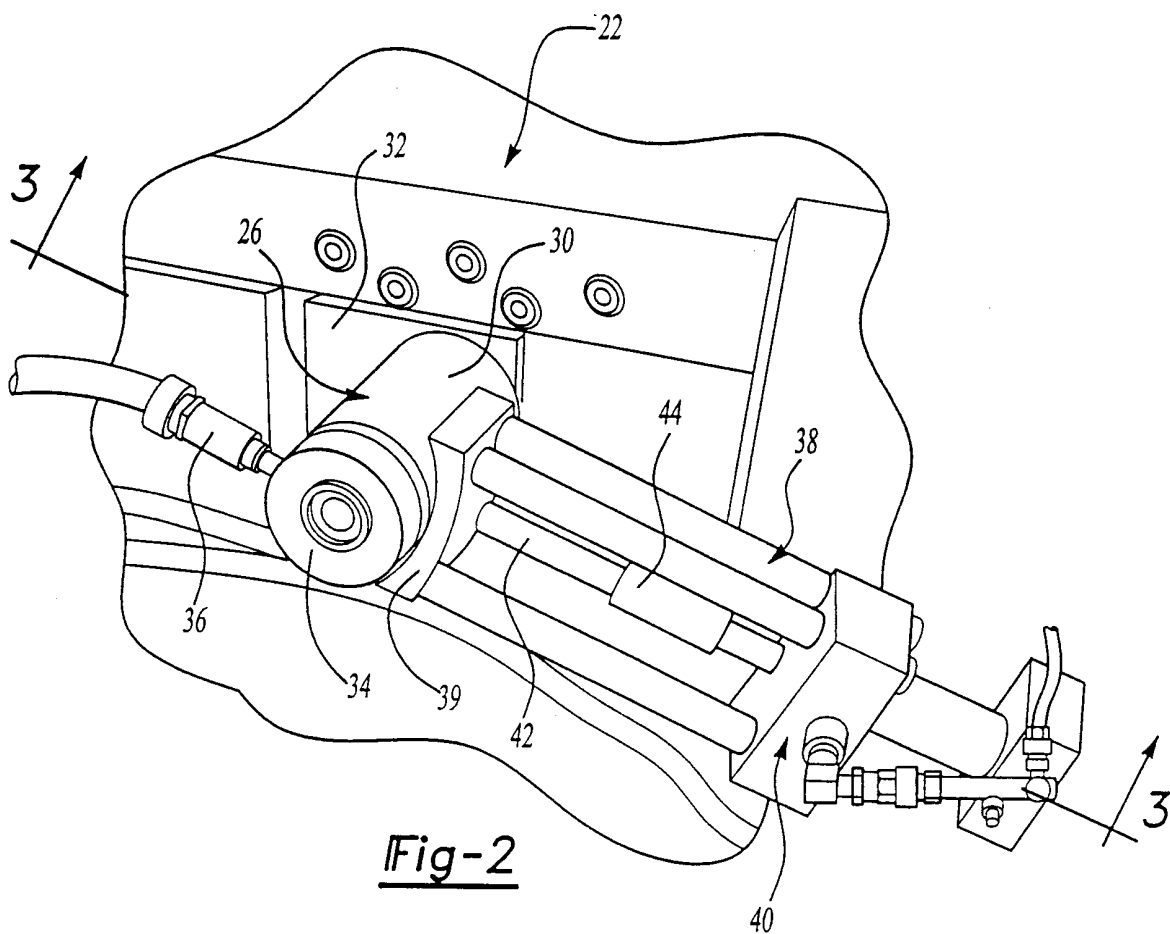


Fig-2

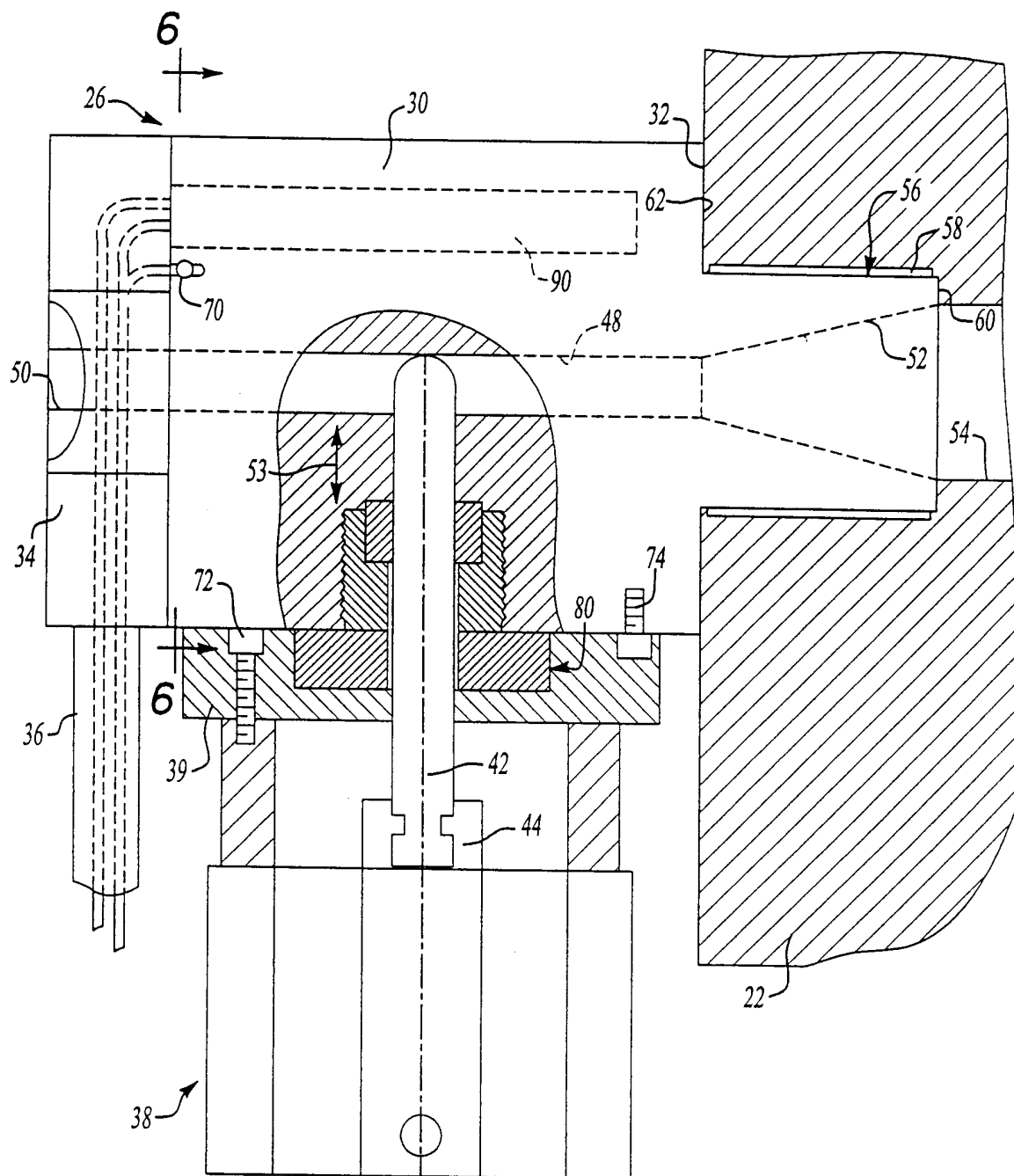


Fig-3

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Fig-4

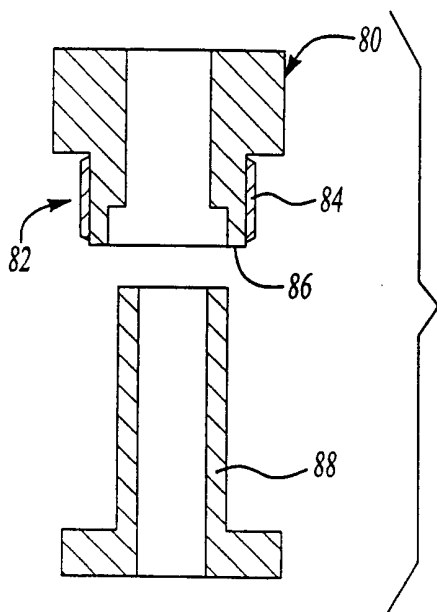
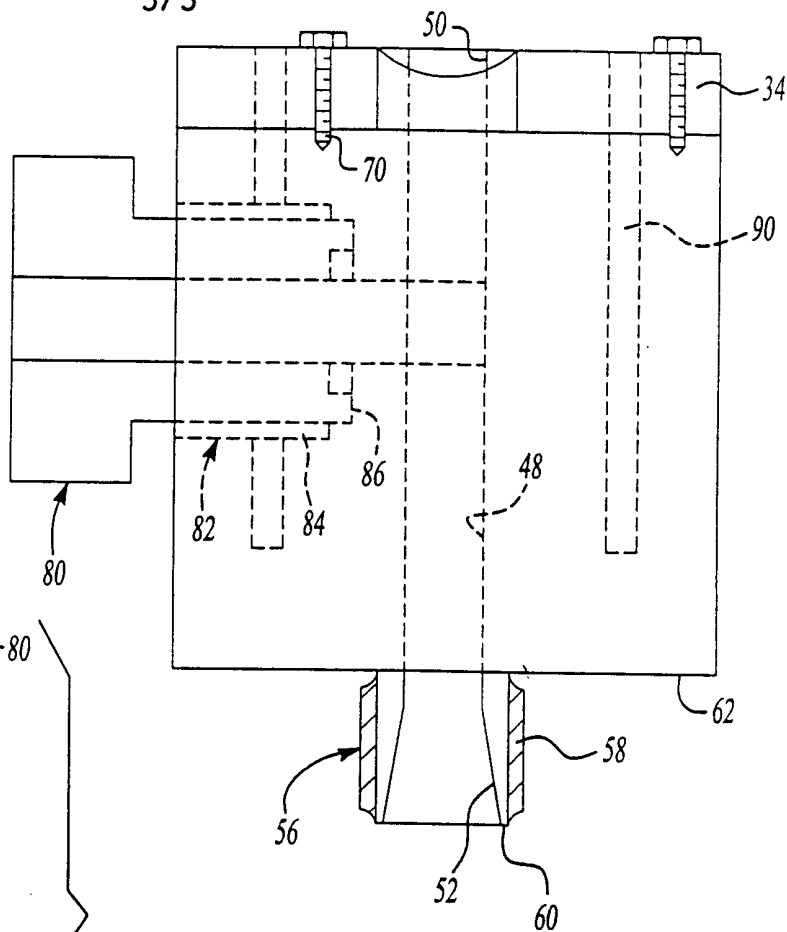
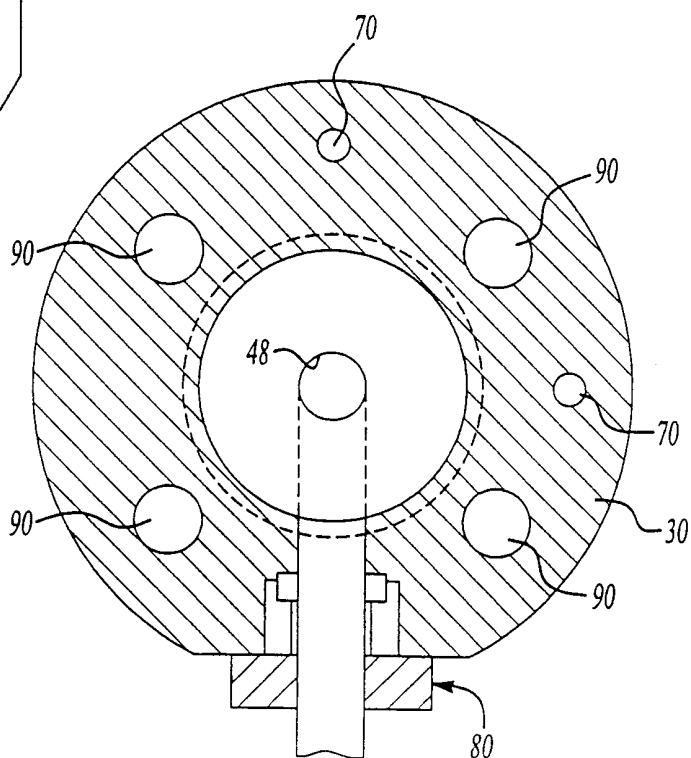


Fig-5

Fig-6



INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/01193

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B29C33/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Alink, M

INTERNATIONAL SEARCH REPORT

International Application No

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