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Fig. 1 Crack in mold core·or cavity. Use a Logic Seal to stop leak and continue molding while you manufacture a replacement part.

Note: On average, it costs one dollar per ton of clamp force to remove and replace a mold. For example, a 300-ton press will incur $300.00 in cost to pull a mold and set it up again, and this figure does not include the additional cost of the actual repair!

Fig. 2 The usual way to cool segmented cores. Water cannot be placed close to the plastic part because using positive pressure, it would create leaks.

Fig 3-5 Note that each core is two pieces so water can be placed close to the molded part. This can only be done with a Logic Seal, or a Vac-U-Temp, otherwise the mold would leak. Naturally, cycle time is greatly improved.

Fig 6 Thin core pin can now be cooled by coolant in main core. With a small pin, it was never possible to cool it effectively due to bubbler size. Using negative pressure no leak will occur from main core**. (FILL THIS IN)**

Fig. 7 Using negative pressure, a core can now be cooled over its entire length if baffles or bubblers cannot be used.

Fig 8,9 Core pins can now be cooled and trapped gasses vented out into the water system using negative pressure

Fig 10,11 Water paths can be put close to the molded product thus improving cycle time.

Fig 12 Good water cooling using negative pressure. Note water up inside of cap.

Fig 13 Usual cooling found in cap molds. The heat from the top of the unscrewing core almost has nowhere to go, since the heat does not transfer well to the center core. Because the unscrewing core is so hot, gailing occurs.

Fig 14 Water is now close to product again, improving cycle time. Gailing is also prevented.

Fig. 15 Good water-cooling was achieved by putting water close to product using a thin insert. Using Negative pressure, no leaks occurred around the insert. A 22 second prevail cycle was achieved while maintaining flatness (sample included).

Fig 16-18 Showing alternative water paths and physical size of the product.

Fig 19 Normal method of cooling odd shaped product. Note that condensation forms on face areas of mold due to different temperature ranges across face.

Fig 20 Now water path can follow odd shape and condensation will not occur because mold is now cooled where it is needed. This also allows you to use colder coolant to gain a faster cycle, still with no sweat.

Fig 21 Complex section molds can now be cooled using negative pressure. Normal syst3ms would leak between systems of positive pressure is used, because it is extremely difficult to locate the "O" rings with this type of construction.

Fig 22 Water close to product. No leaks will occur between plates using negative pressure.

Fig 23 This product suffered from trapped gasses and lack of sufficient cooling in gate area because ejector pin is there.

Fig 24 Using negative pressure, gasses are now vented out into water. Ejector pin is cooled also (ample included).

Fig 25 Complex unscrewing being cooled correctly. Note water is close to product. This cannot be achieved without using a Logic Seal or Vac-U-Temp.

Fig. 26 Normal three plate mold producing molds or similar parts. It is gated at the top because side gates will create gas burn at top of product (sample included).

Fig 27 By using vented core, gases can now be drawn into water line. No burn occurs. Major advantages:

1. Two-plate mold is much less expensive to build.
2. Two-plate mold is able to run at much faster overall cycle (sample included).

Fig 28 By using negative pressure, ejector pins can literally be positioned through a water channel. This allows optimum placement for best ejection, cooling off ejector pins, plus venting of gases into the water line.

Note:
1. The pin is vented all the way around its circumference for maximum venting.
2. An "O" ring is used at the beck end of the pin so that air intake is minimized. Cooling would be reduced if more air entered the line, as this means less water.

Fig 29 Another example of venting gasses from normally trapped areas.

Fig 30 Tube gated at the top to allow gases to be vented at the parting-line of mold. Core flexes under injection pressure and results in uneven filling. an 8:1 length to width ratio will result in trouble; this product had an actual 10:1 ratio because the customer had assumed that 11:1 was all right.

Fig 31 Part is shown here gated at the bottom with gases vented through stainless steel screen into the water line. No flexing or gas entrapment.

Fig 32 Using the negative pressure system of our patented water transfer system, long, thin cores or the tips of cores can be cooled – this dramatically improves cycle time. The 24 Cavity pen barrel mold was originally molded at a 28 second cycle. Water transfer brought it down to 14 seconds.

Fig 33 Normal cooling of long, thin cores. Temperature at the non cooled tip dictates cycle time.

Fig 34-36 Pipette molds with and without tip cooling. This part has identical before and after cycle times as the one shown in Fig. 32.

Fig. 37 Good cooling achieved by using Water Transfer, thus better cycle time. This also shows venting into the parting line and closing the drain vent with a hard rubber seal.

Fig 38 Again good cooling in center of hub and up inside flanges using Water Transfer. This makes a good cycle time possible.

Fig 39 Note the .070 Dia. Core pins being cooled by Water Transfer. Water holes are constructed of stainless steel tubing with .125 OD and .020 ID.

Fig 40 Cap with small hole through it can now be cooled at hot areas. Again, improved cycle results.

Fig. 41 You can even go through an ejector sleeve by using negative pressure. This part also incorporates Water Transfer.

Fig 42 Sliding core is cooled using Water Transfer. Good cooling is achieved through existing hole, improving cycle time.

Fig 43 Schematic of water transfer system again in cooling mode.

Fig 44 Schematic of Water Transfer system while in mold-open mode.

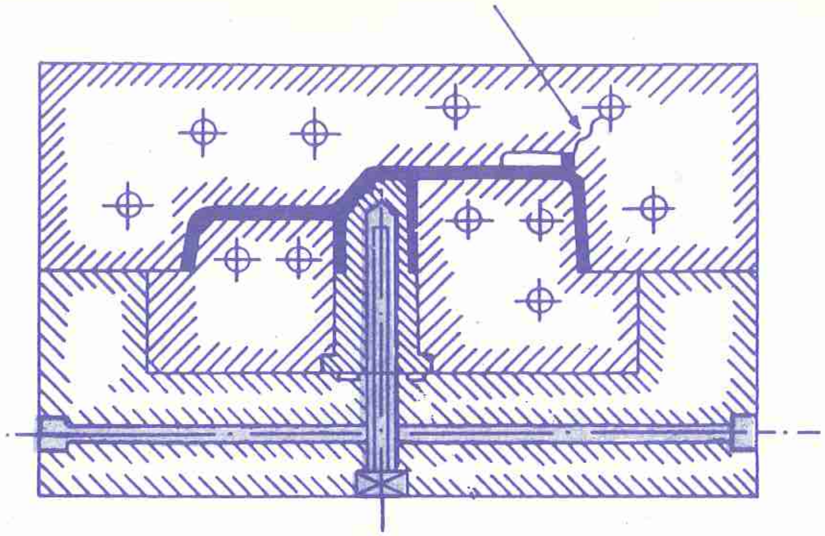


Fig 1

START USING A LOGIC SEAL JUST TO STOP A LEAK BUT THEN ________

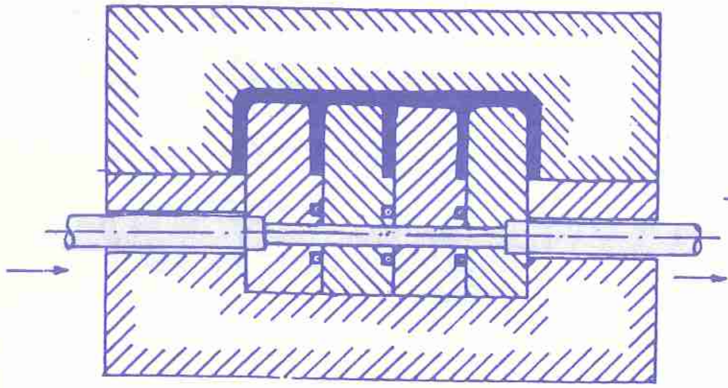


Fig 2

WHY BUILD A MOLD LIKE THIS, IT WILL LEAK AND BE A LONG CYCLE.

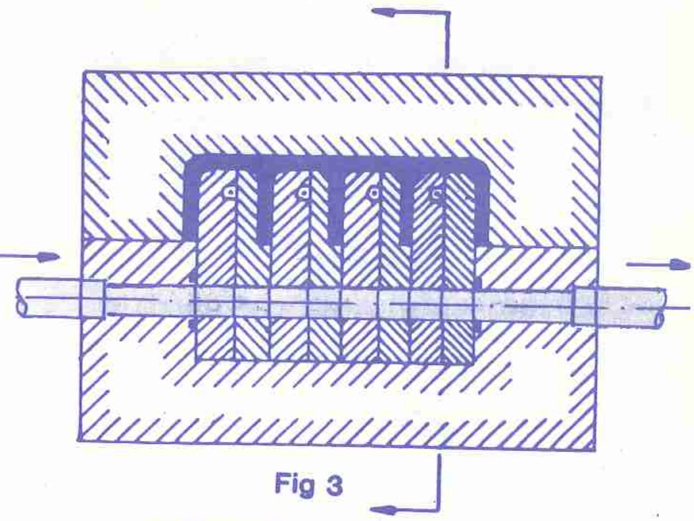


Fig 3

WHY NOT DO IT THIS WAY FASTER CYCLE, NO LEAKS

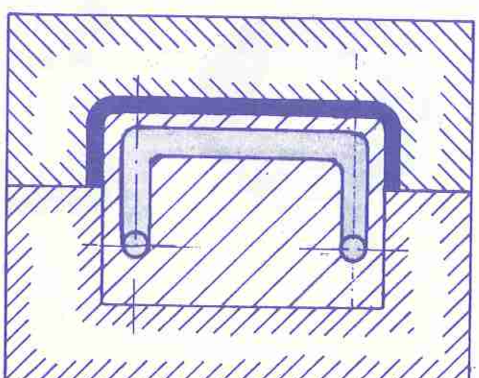


Fig 4

WATER WHERE YOU WANT IT USING A NEGATIVE PRESSURE LOGIC SEAL

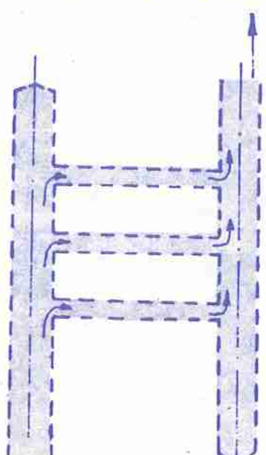


Fig 5

WATER PATH

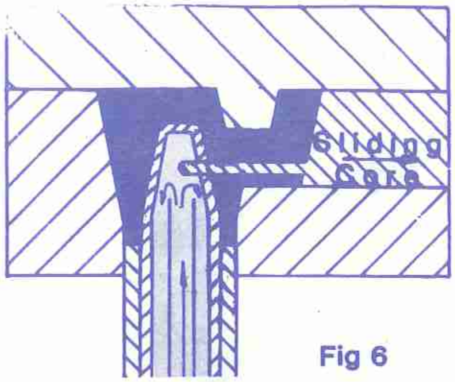


Fig 6

CORE PIN SLIDES DIRECTLY INTO COOLANT IN MAIN CORE.

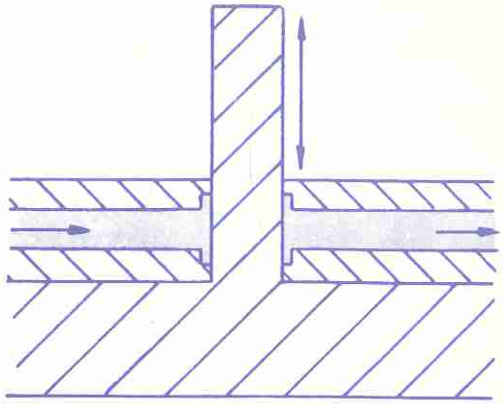


Fig 7

AS STRIPPER PLATE MOVES ENTIRE CORE IS WIPED WITH WATER.

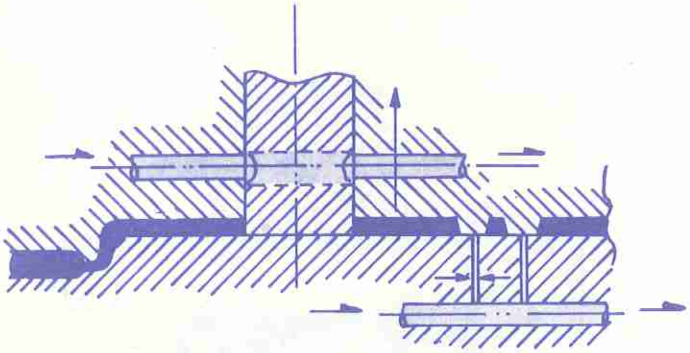


Fig 8

VENTING & COOLING CORE PINS.

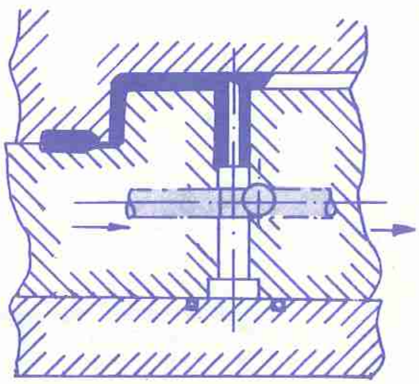


Fig 9

COOLING A CORE PIN FOR FASTER CYCLE.

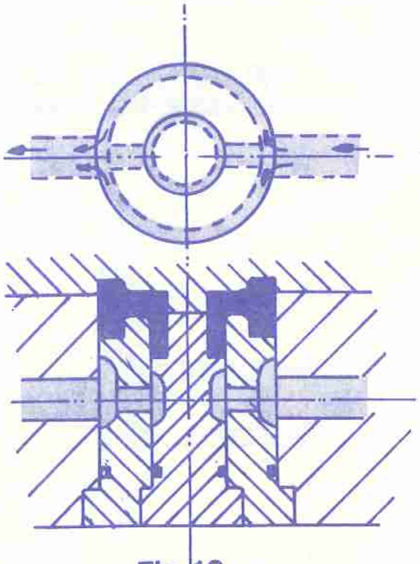


Fig 10

WATER COOLS THE HUB. THE CENTER CORE WATER CAN BE CLOSER TO PLASTIC.

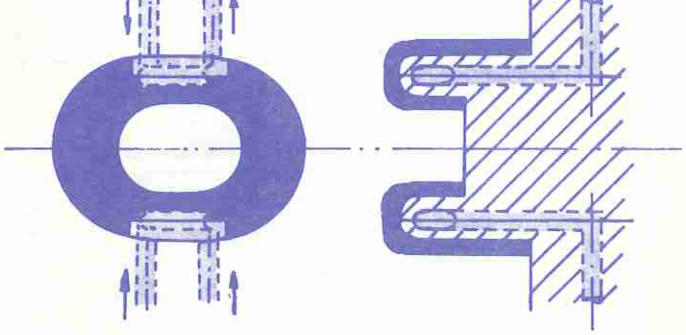


Fig 11

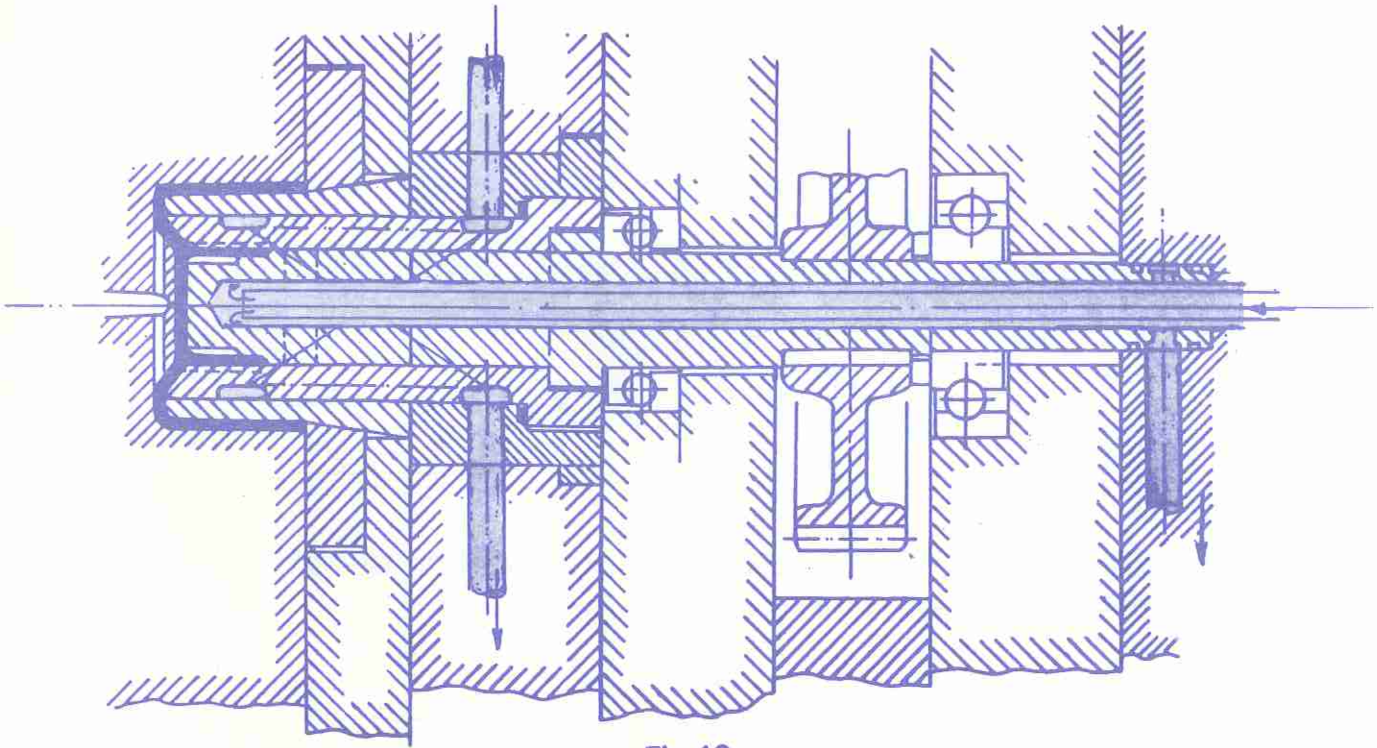


Fig 12

COOLING A CAP MOLD BY PUTTING WATER WHERE YOU WANT IT.
BY USING A LOGIC SEAL

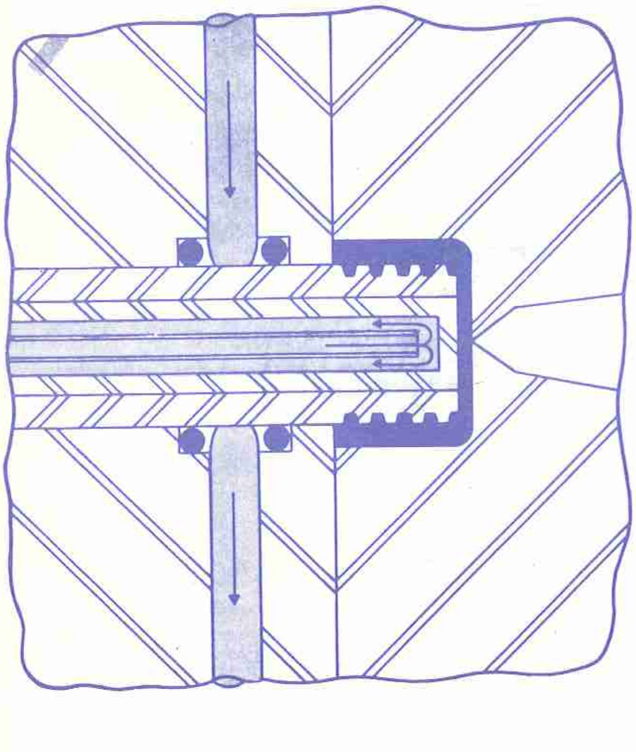


Fig 13

COOLING A BOTTLE CAP AS NORMALLY FOUND IN EXISTING MOLDS.

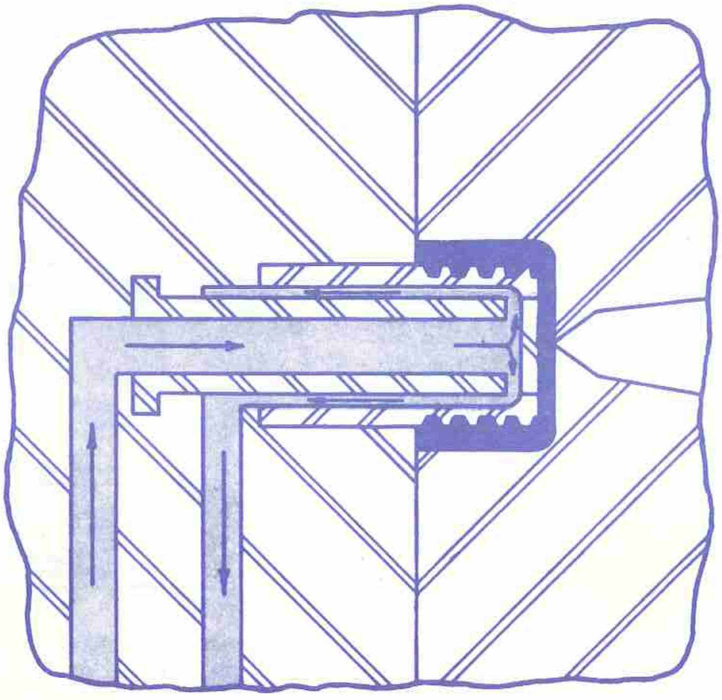


Fig 14

COOLING A BOTTLE CAP USING NEGATIVE PRESSURE.

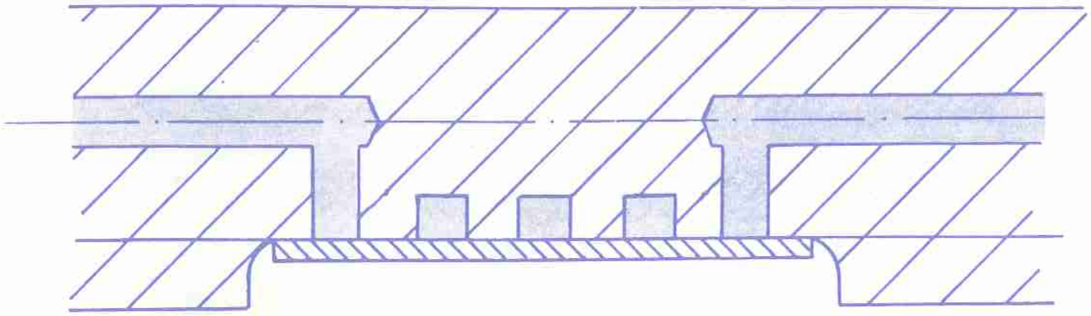


Fig 15

WATER CAN BE CLOSE TO PRODUCT WITHOUT LEAKS OCCURING AROUND INSERT.

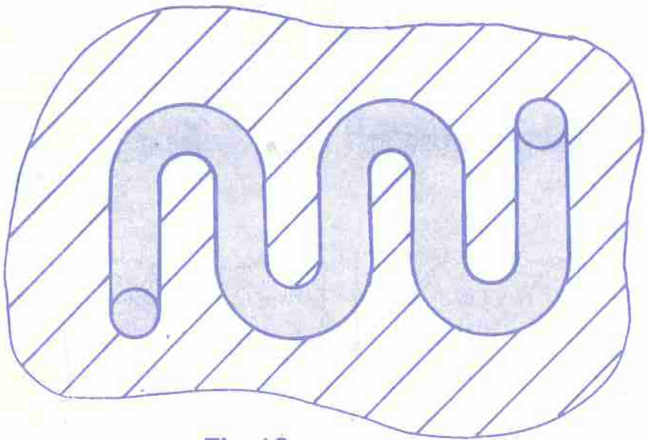


Fig 16

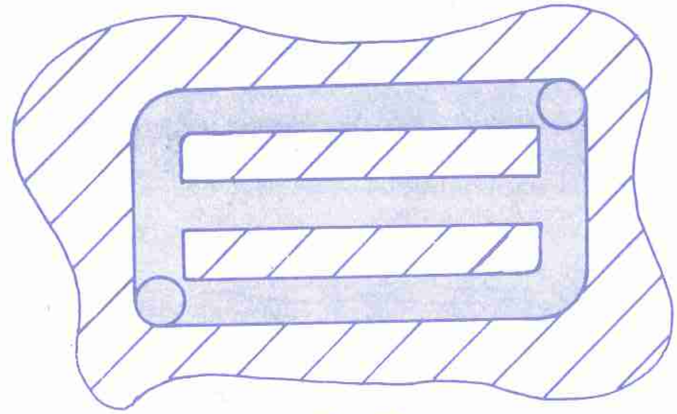


Fig 17

FIGURES 16 AND 17 ARE SOME ALTERNATIVE WATER PATHS.

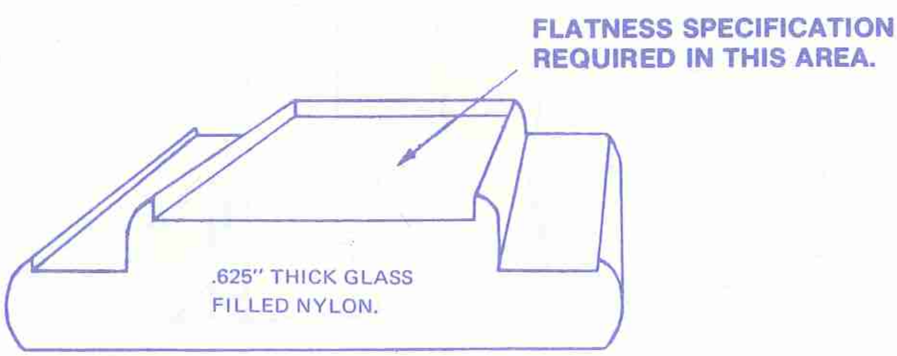
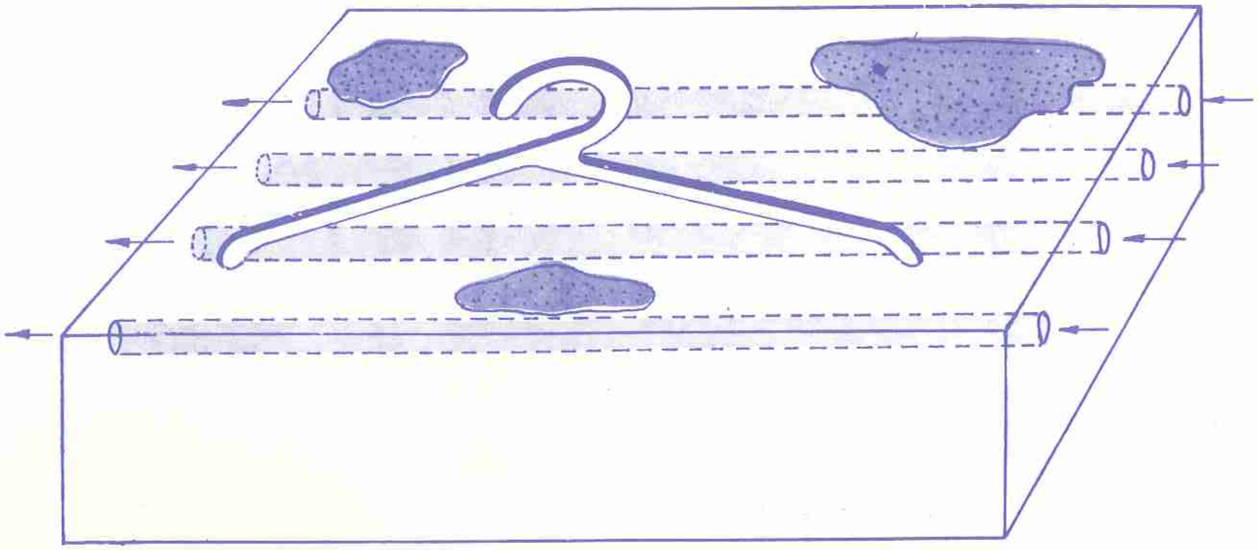


Fig 18

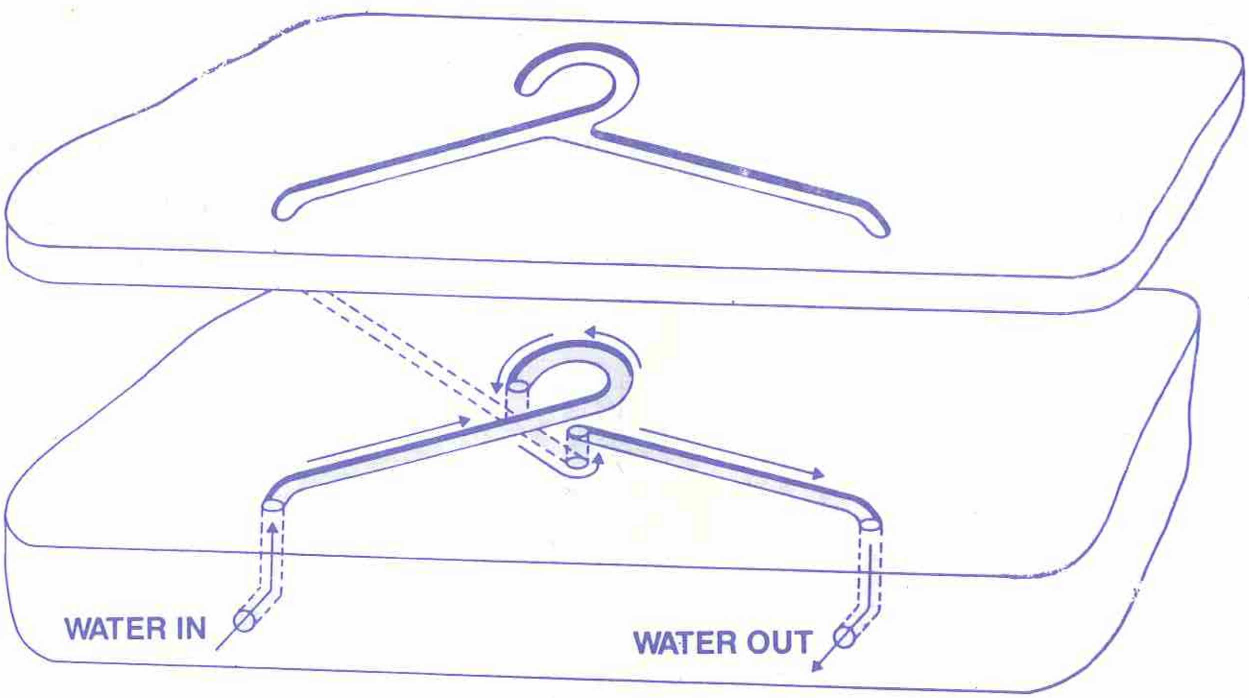
THE ABOVE SYSTEM WAS USED TO MOLD THIS PRODUCT. AT A 22 SECOND OVERALL CYCLE NOTE: THICK SECTION UNDER THE AREA WHERE FLATNESS WAS CRITICAL.



A NORMAL METHOD OF COOLING

Fig 19

TO ACHIEVE EVEN COOLING, DISTRIBUTION WATER LINES ARE NOT CLOSE TO PRODUCT. UNWANTED CONDENSATION OCCURS ON FACE OF MOLD.



PUTTING WATER RIGHT WHERE YOU NEED IT.

EVEN COOLING AND NO CONDENSATION.

Fig 20

COOLING A SEGMENTED CORE. NO LEAKS OCCUR BETWEEN SEGMENTS. THIS IS IDEAL FOR MULTI-INSERT ELECTRICAL CONNECTOR MOLDS WHERE COOLING IS NOT NORMALLY POSSIBLE.

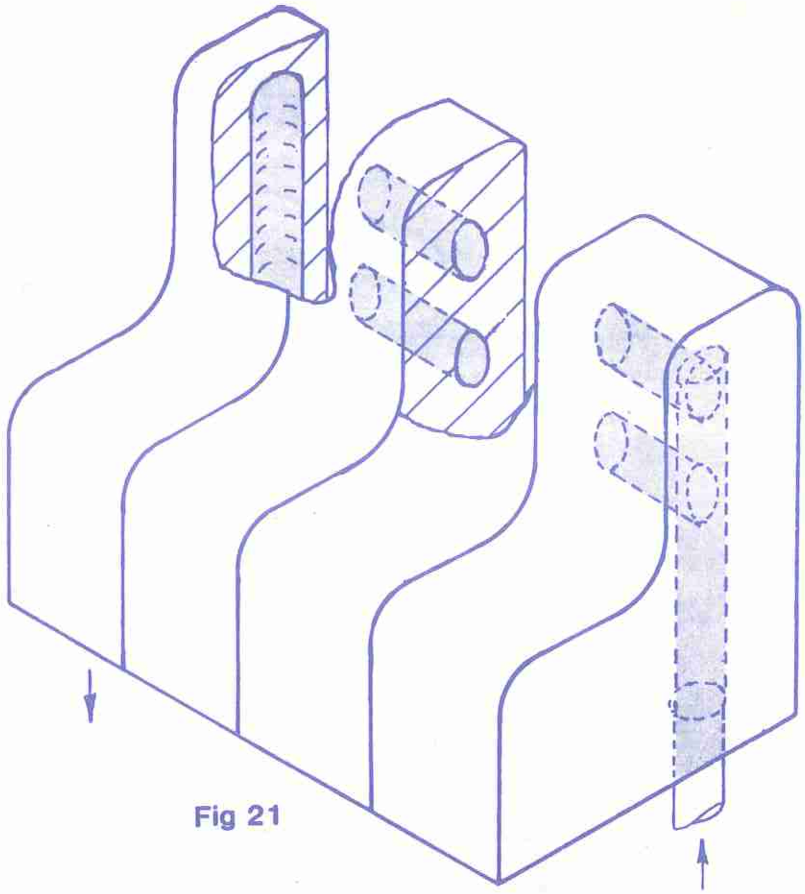


Fig 21

WATER CHANNEL MACHINED DIRECTLY INTO FRAME. MAXIMUM EVEN HEAT DISBURSEMENT TAKES PLACE BECAUSE HEAT IS TRANSFERRED DIRECTLY INTO WATER AND NOT THROUGH STEEL.

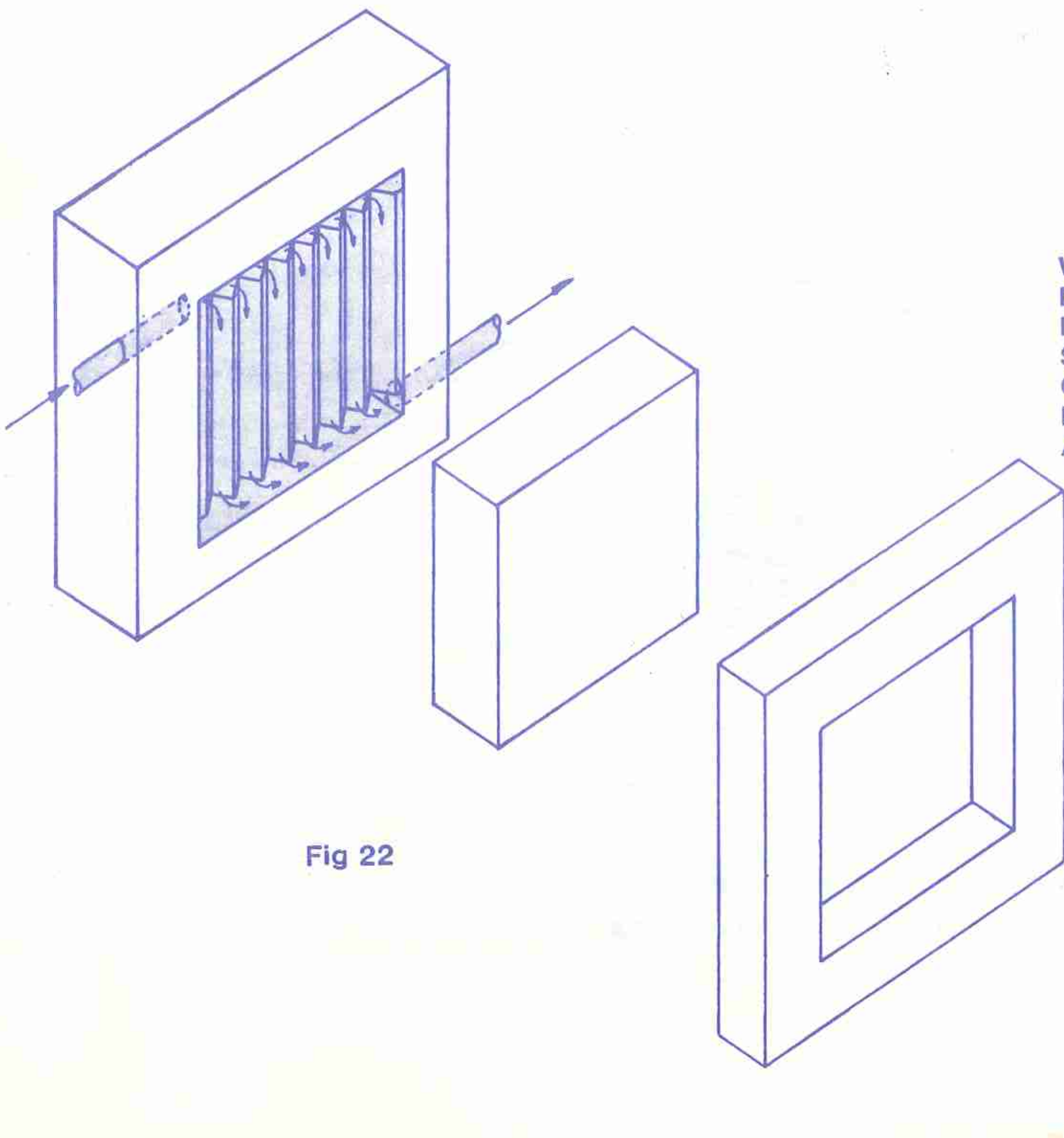


Fig 22

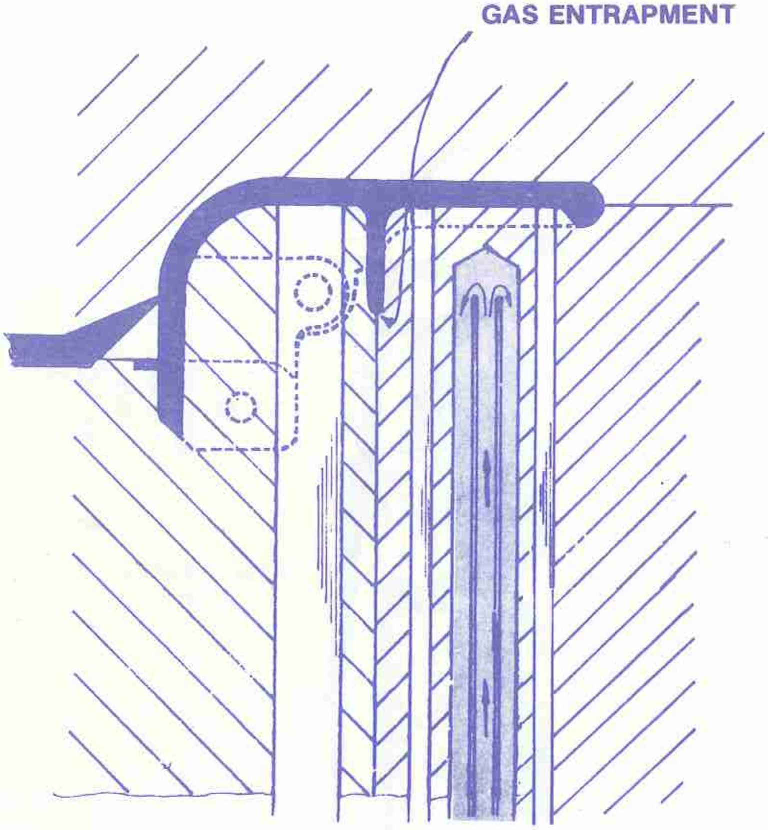
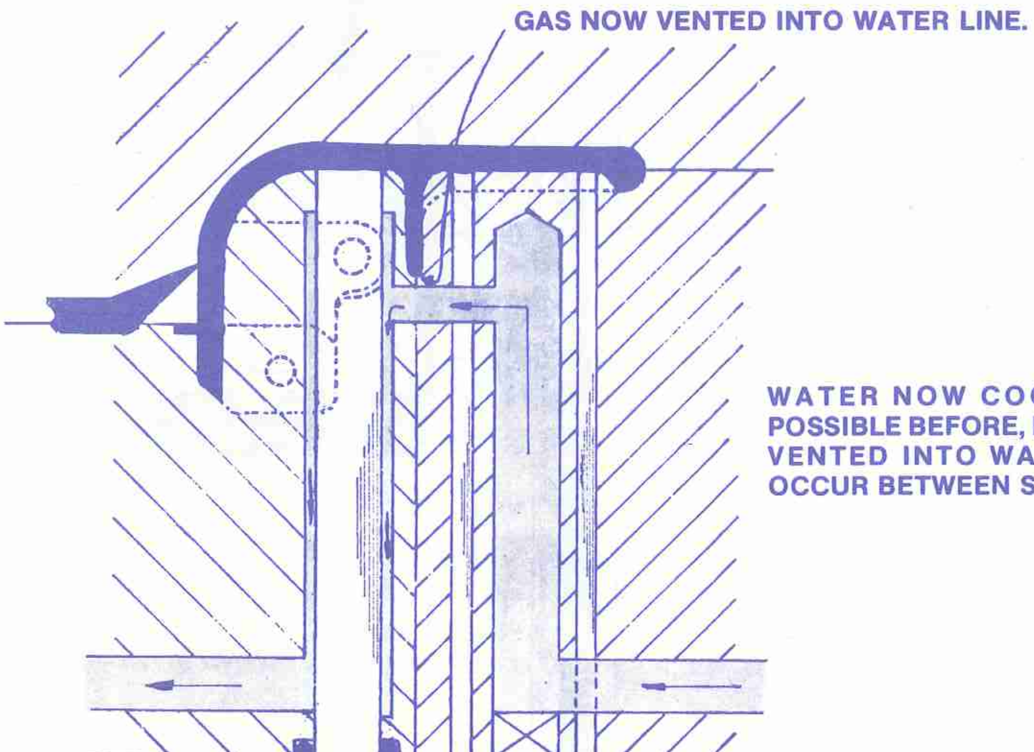


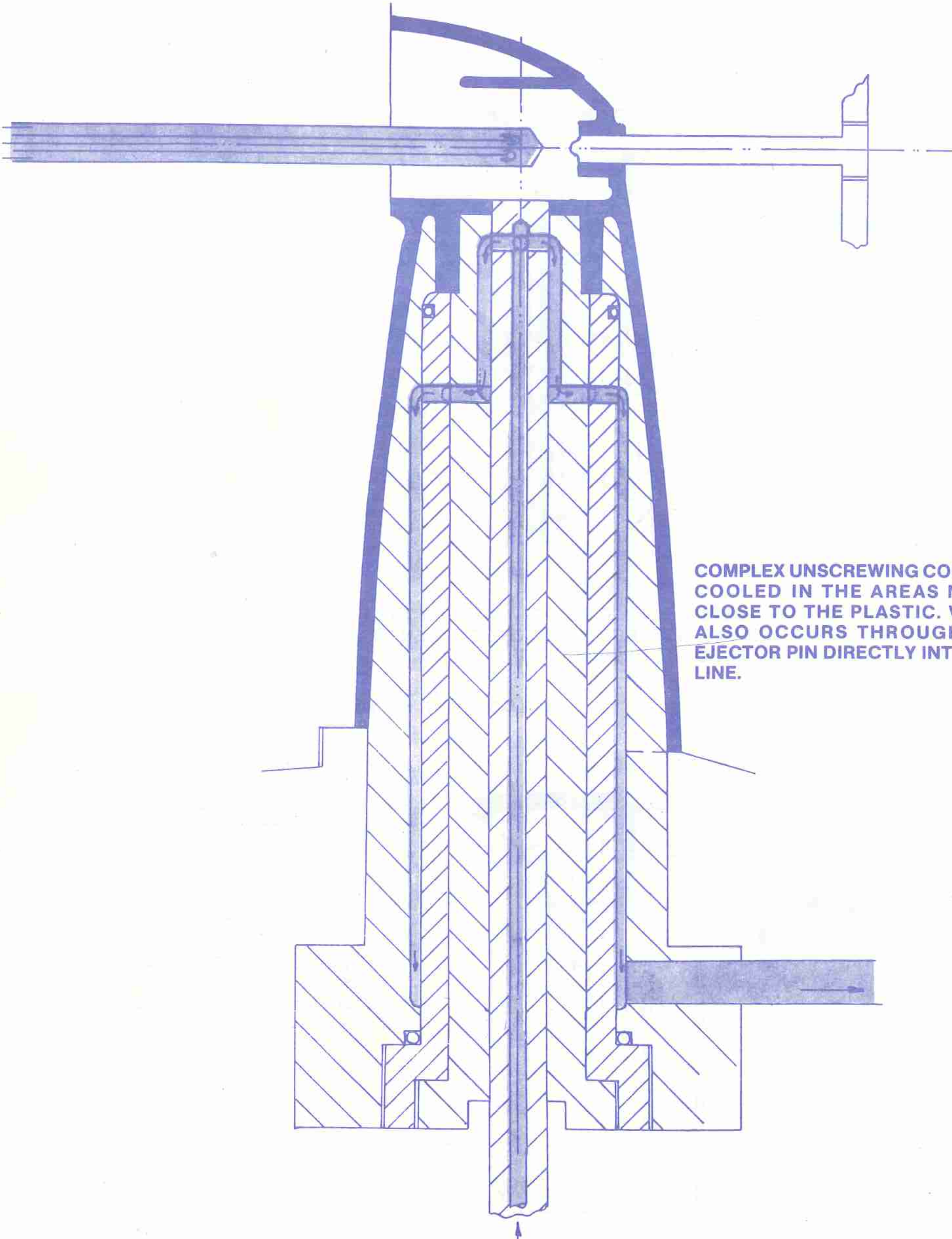
Fig 23

NORMAL COOLING USED BECAUSE EJECTOR PINS RESTRICT WATER BEING PUT WHERE IT IS NEEDED. SEVERE GAS ENTRAPMENT INCURRED DUE TO PRODUCT DESIGN.



WATER NOW COOLS AREA NOT POSSIBLE BEFORE, PLUS GAS IS NOW VENTED INTO WATER. NO LEAKS OCCUR BETWEEN SEGMENTS.

Fig 24



COMPLEX UNSCREWING CORE BEING COOLED IN THE AREAS NEEDED, CLOSE TO THE PLASTIC. VENTING ALSO OCCURS THROUGH TIP OF EJECTOR PIN DIRECTLY INTO WATER LINE.

Fig 25

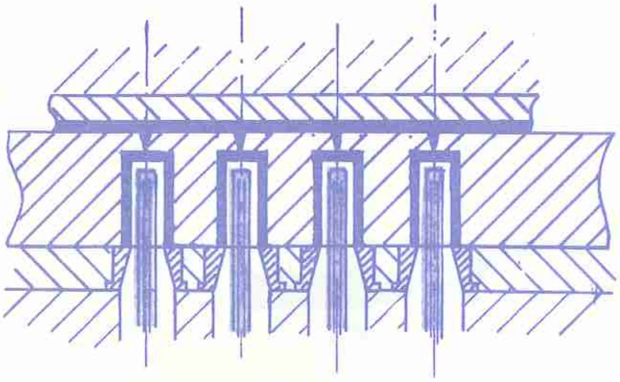


Fig 26

THREE PLATE OR HOT RUNNER MOLD IS USED TO PRODUCE A MULTIPLE CAVITY MOLD OF A PART LIKE THIS.

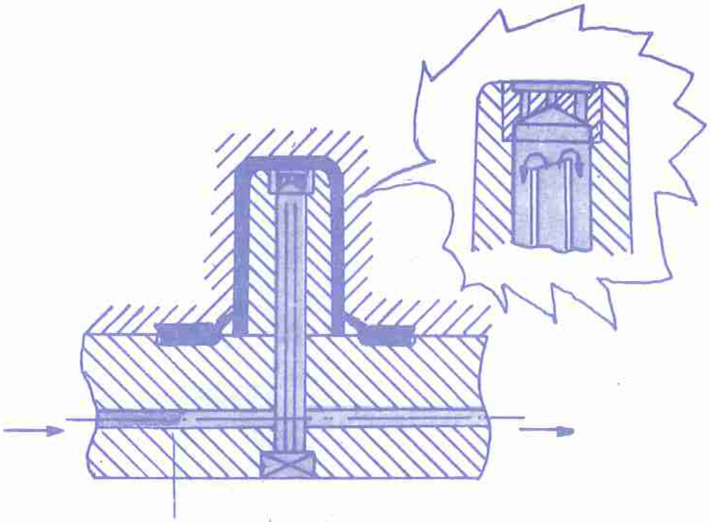


Fig 27

BY USING VENTED CORES,DESIGN MOLDS TO VENT INTO WATER LINES GIVING DIFFERENT GATE LOCATIONS AND MULTIPLE CAVITIES WITHOUT THREE PLATE OR HOT RUNNER MOLDS.

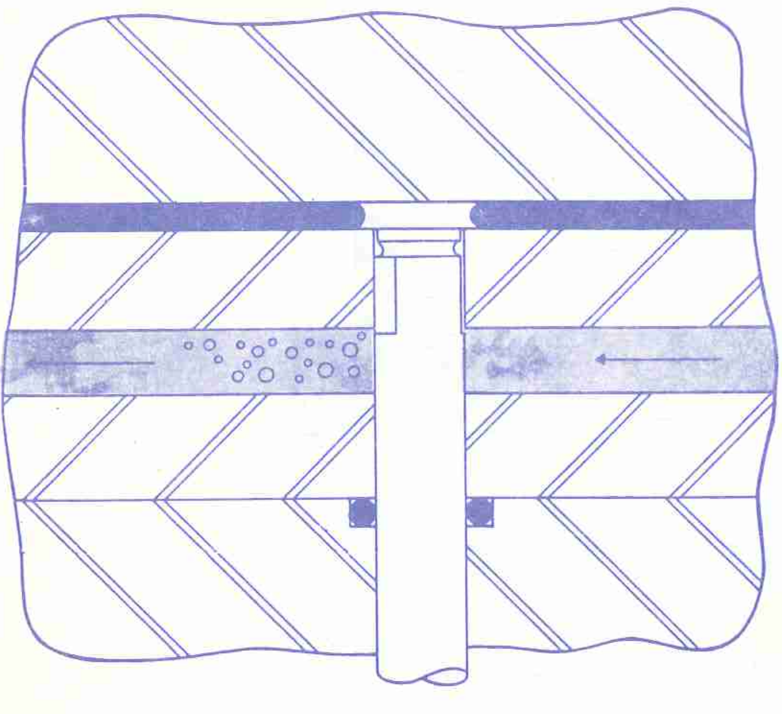


Fig 28

VENT AN EJECTOR PIN DIRECTLY INTO WATER. GASES ARE DRAWN INTO WATER USING NEGATIVE PRESSURE.

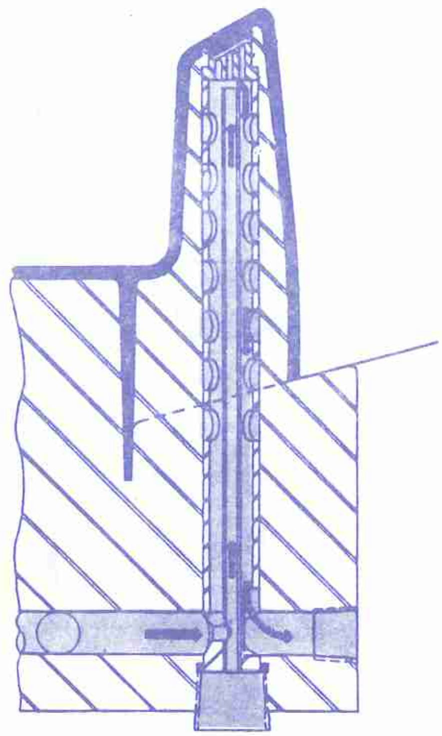


Fig 29

COOLING USING VENTED CORE DIRECTLY INTO WATER.

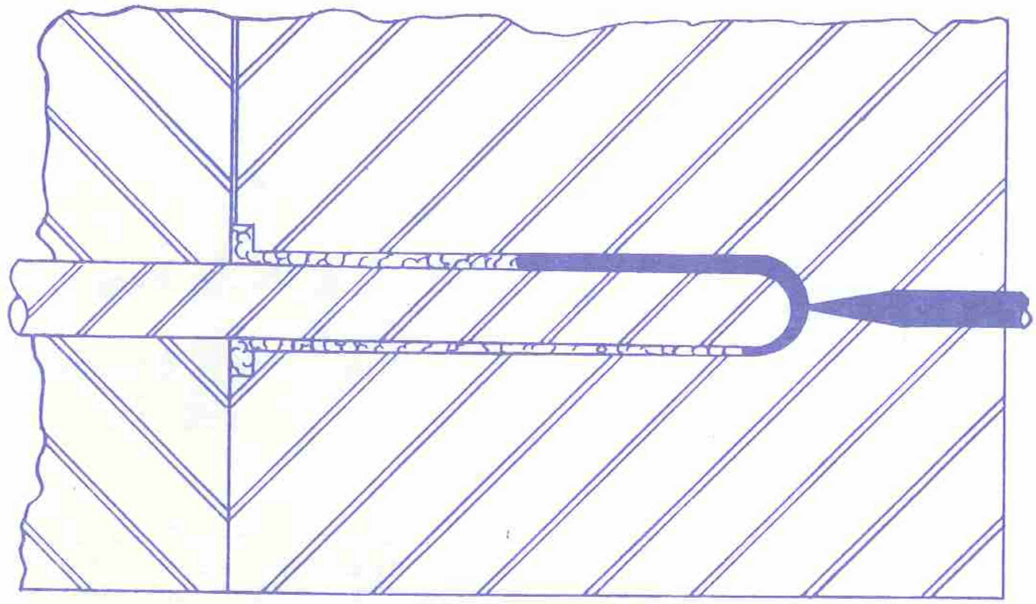


Fig 30

LONG, UNSUPPORTED CORES WILL FLEX DUE TO UNEVEN FILL DURING INJECTION.

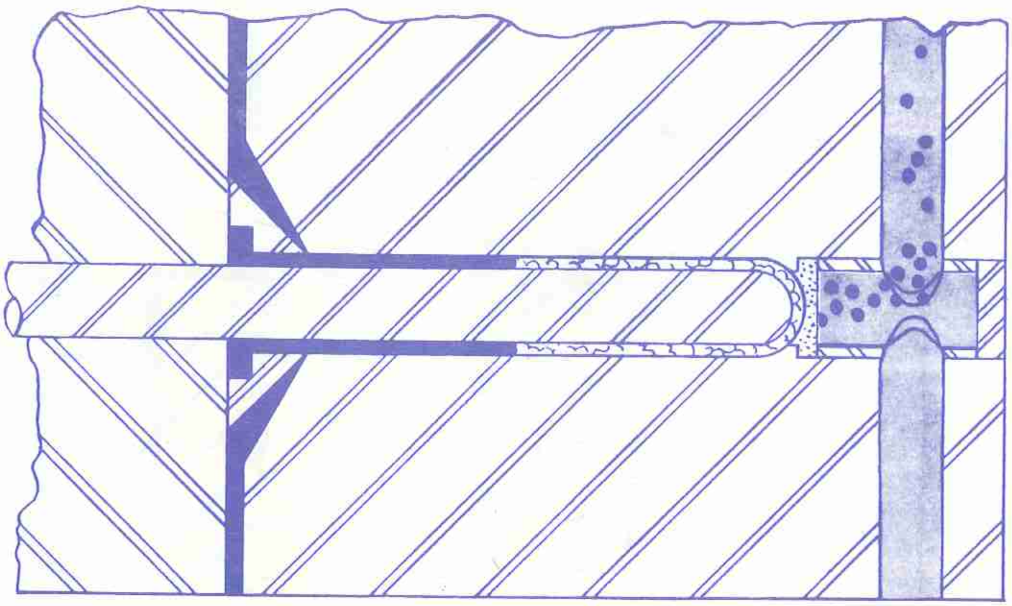


Fig 31

THIS IS AVOIDED BY GATING AT THE BOTTOM AND VENTING INTO THE WATER LINE USING POROUS METAL INSERT.

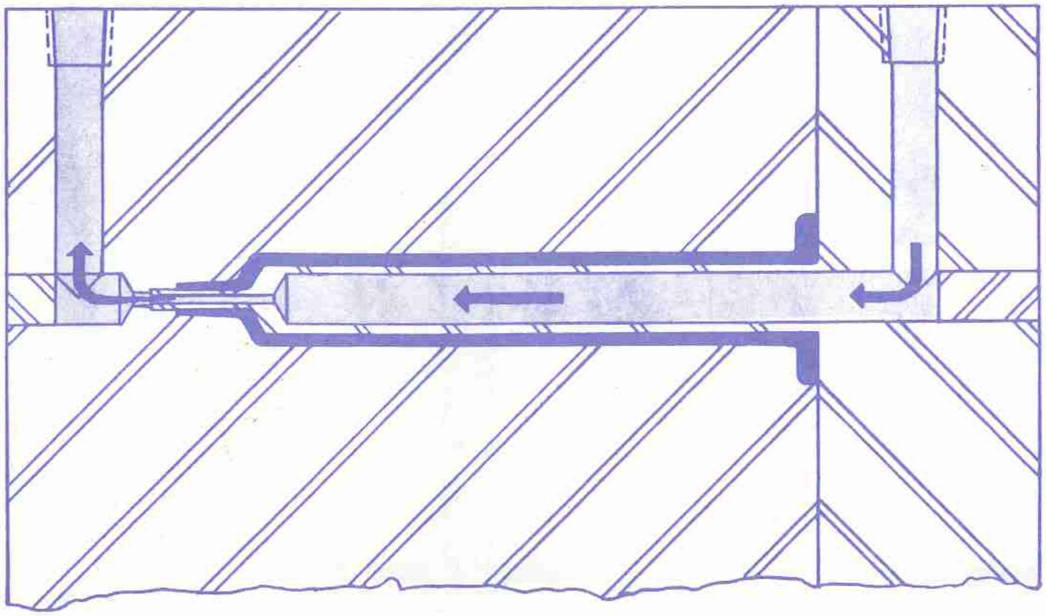


Fig 32

BY USING OUR PATENTED WATER TRANSFER PROCESS, ULTIMATE COOLING IS ACHIEVED AT THE END OF A THIN CORE. FASTER CYCLE TIMES RESULT.

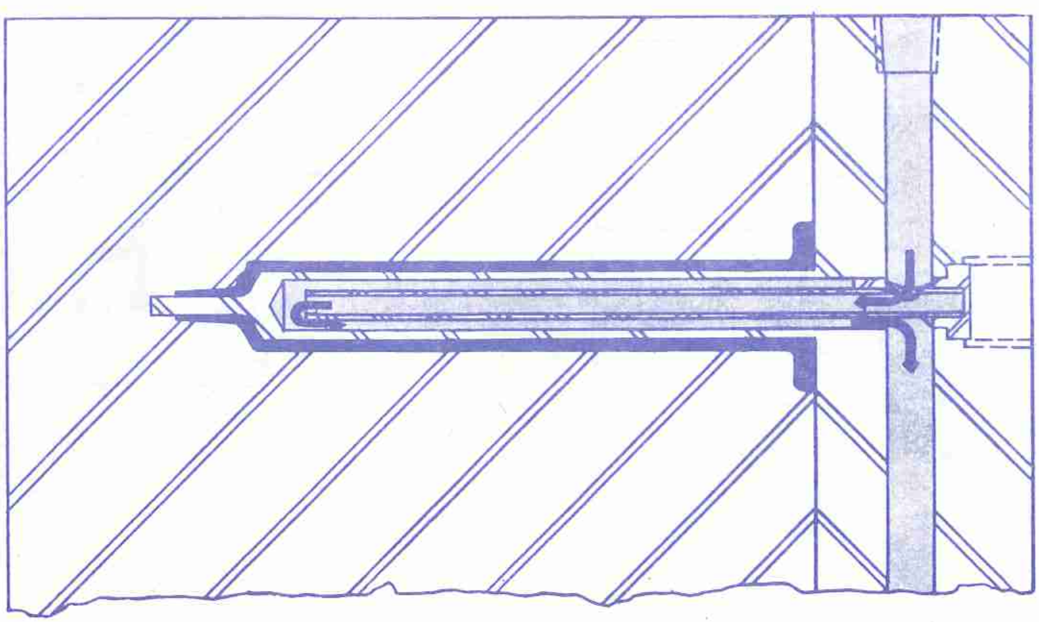


Fig 33

NORMAL COOLING OF CORE. CYCLE IS DICTATED BY WAITING FOR TIP TO COOL.

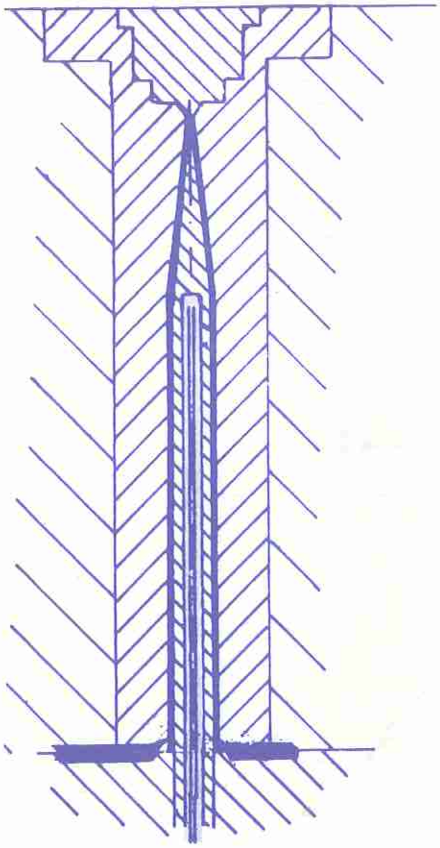


Fig 34

NORMAL COOLING OF LONG THIN CORE.

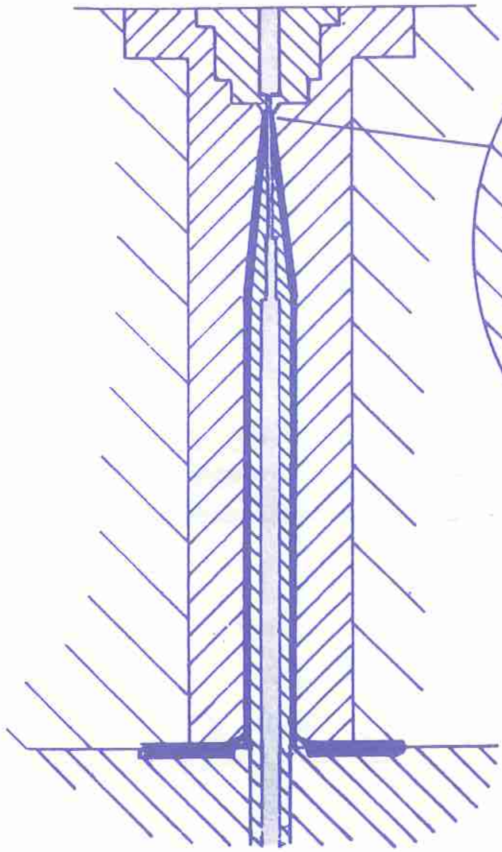


Fig 35

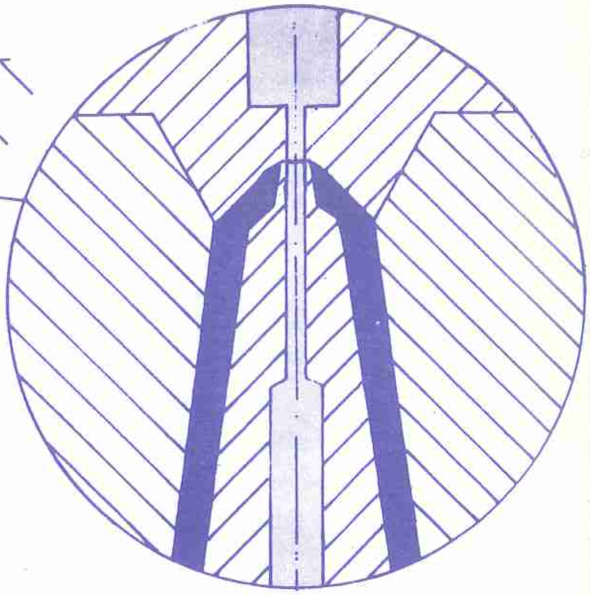


Fig 36

FASTEST POSSIBLE COOLING TIME ACHIEVED BY USING WATER TRANSFER.

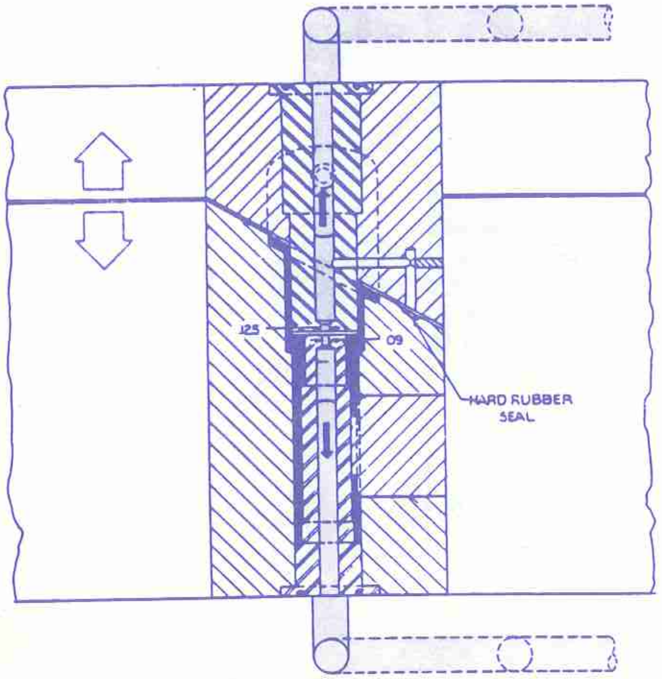


Fig 37

BEST COOLING ACHIEVED USING WATER TRANSFER.

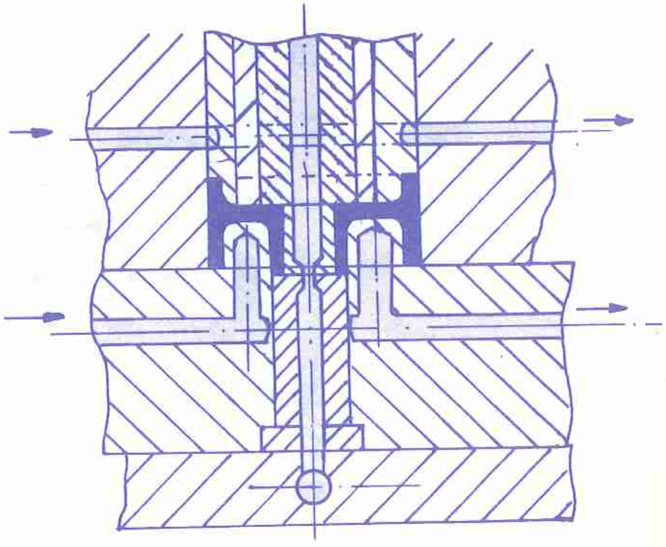


Fig 38

CENTER HUB COOLED FASTEST BY USING WATER TRANSFER. MAXIMUM COOLING ACHIEVED INSIDE FLANGES WITH NO LEAKS USING NEGATIVE PRESSURE.

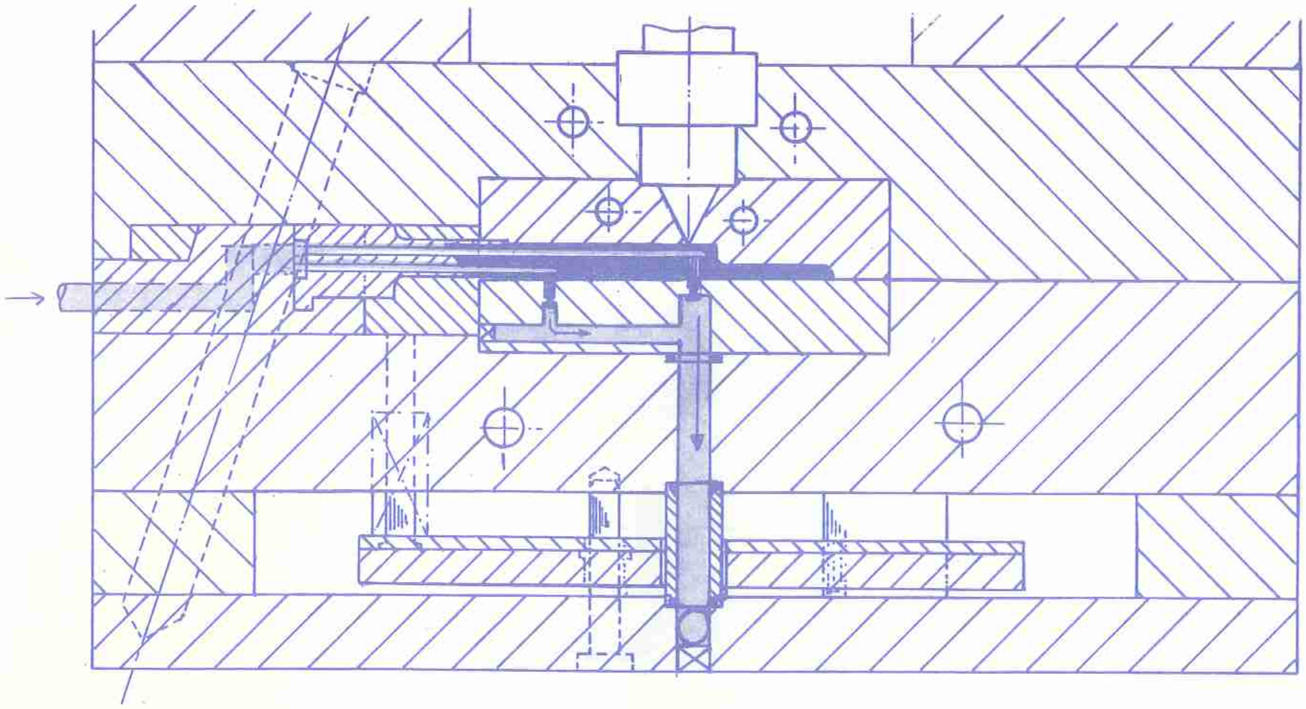


Fig 39

COOLING .070 DIAMETER CORE PINS USING WATER TRANSFER. BERYLIUM COPPER CORES ARE NORMALLY USED TO TRY TO COOL CORES. WITH WATER TRANSFER SIGNIFICANT CYCLE SAVINGS ARE ACHIEVED.

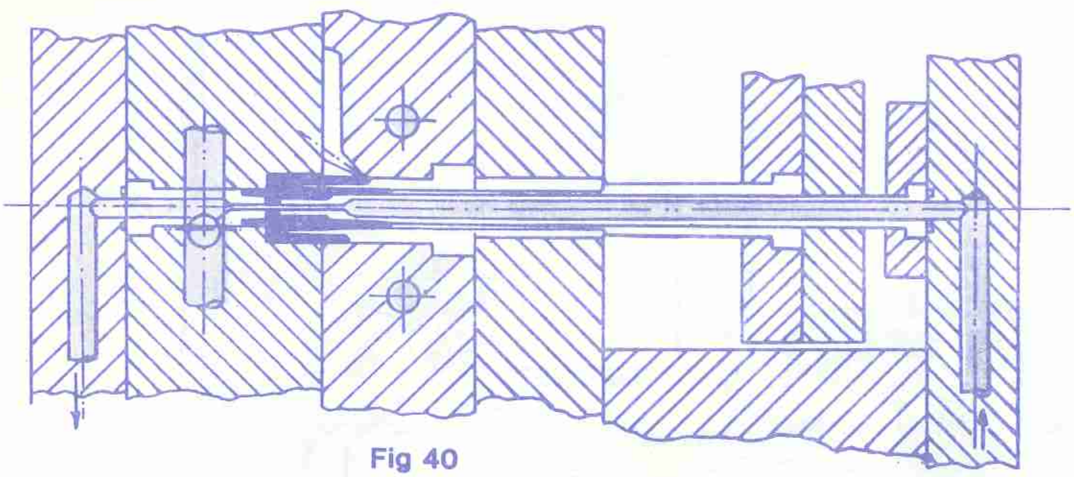


Fig 40

COOLING A CAP MOLD THAT HAS A SMALL HOLE THROUGH THE PART

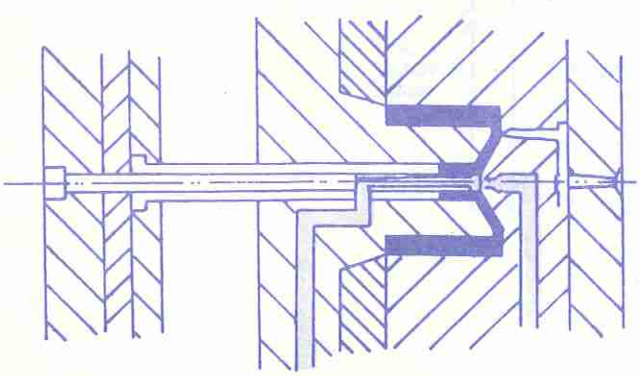


Fig 41

USING WATER TRANSFER THROUGH AN EJECTOR SLEEVE.

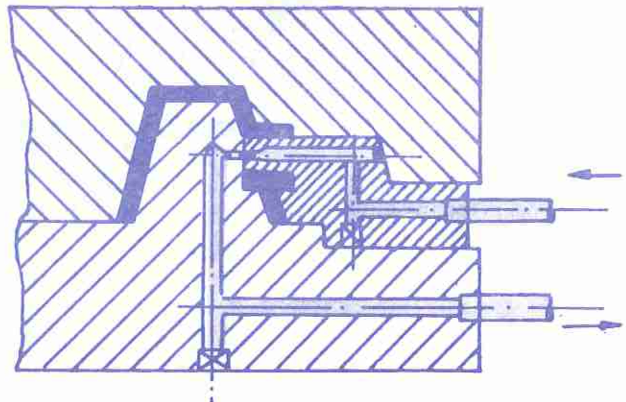


Fig 42

COOLING A SLIDING CORE USING WATER TRANSFER

WHEN MOLD CLOSES, WATER ENTERS MOLD AND GOES DIRECTLY THROUGH THE CORE AND CAVITY, RETURNING TO THE LOGIC SEAL BY USING NEGATIVE PRESSURE. SOLENOID VALVE 'A' IS OPENED BY TIMER ALLOWING WATER TO MOLD. CHECK VALVE IS OPEN. SLOW CLOSING VALVE IS OPEN. MAXIMUM COOLING TAKES PLACE. SEE Fig. 44 FOR OPENING CYCLE.

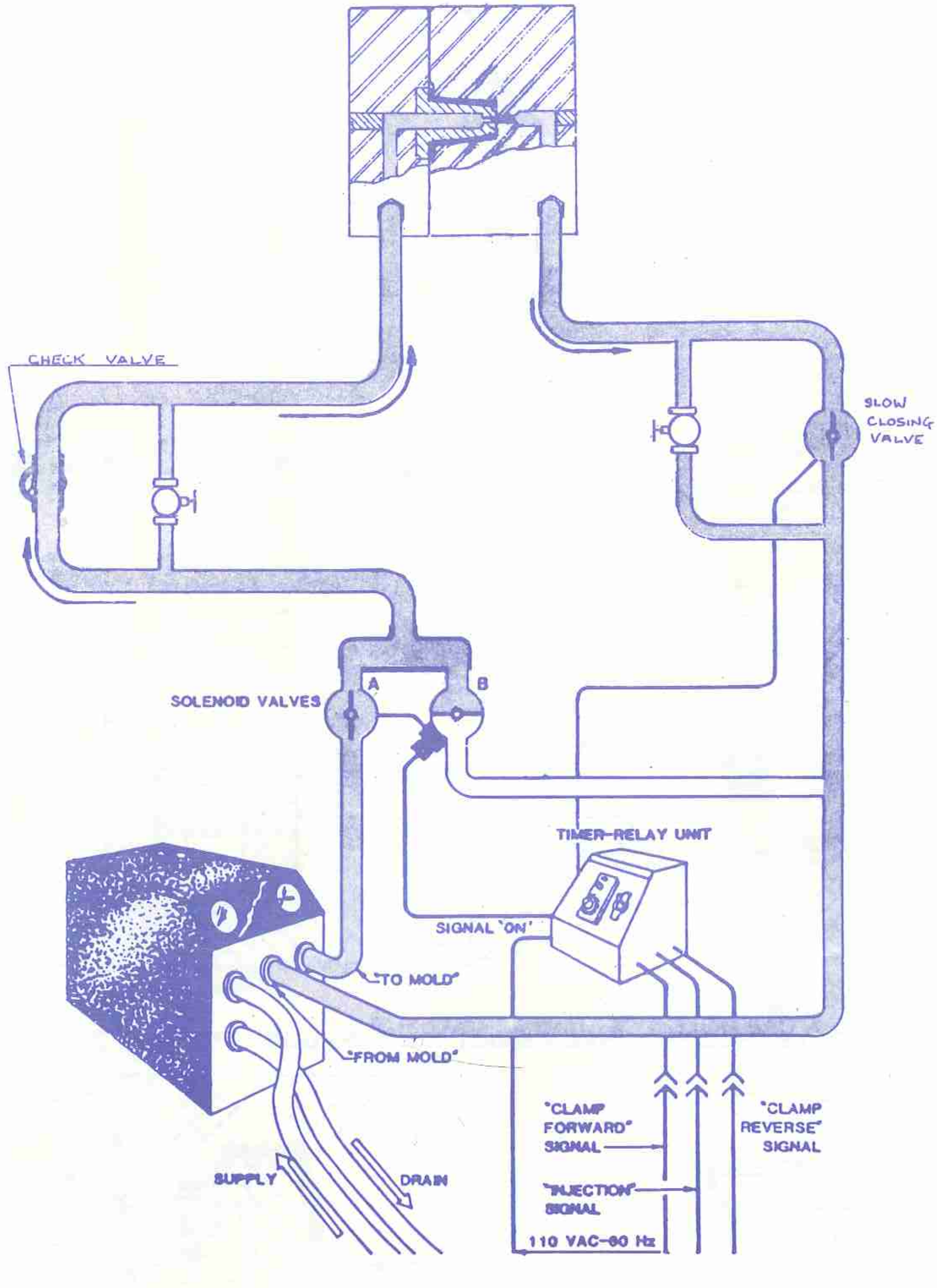


Fig 43

WHEN TIME TIMES OUT, SOLENOID 'A' IS CLOSED AND SOLENOID 'B' IS OPENED. CHECK VALVE AND SLOW CLOSING VALVE BOTH CLOSE. BY CLOSING SOLENOID 'A', NO WATER GOES TO MOLD. BOTH SIDES OF MOLD ARE NOW UNDER NEGATIVE PRESSURE. COOLING WATER IS DRAWN BACK TO LOGIC SEAL THEREFORE, NO WATER WILL LEAK FROM CORE OR CAVITY.

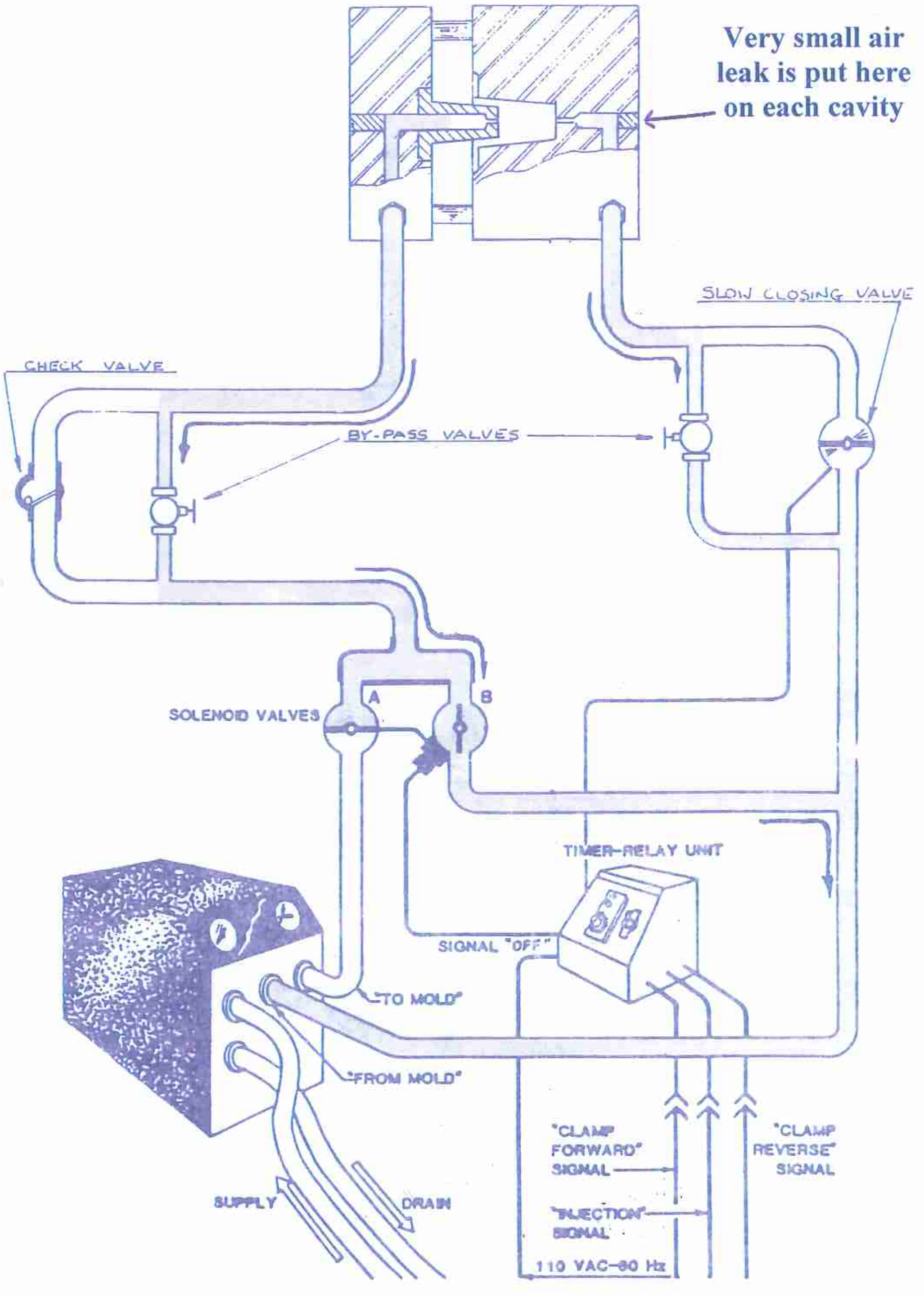


Fig 44