VICTOR GASKET DIVISION

DANA SERVICE PARTS DIVISION

CO-OPERATIVE ENGINEERING

MEETING

OCTOBER 27, 1969

CHICAGO, ILL.

VICTOR GASKET DIV. and SERVICE PARTS DIV.

ENGINEERING CO-OP MEETING

Personnel Attending Meeting

DANA SERVICE PARTS DIVISION

E. P. Breneman	-	Planning Mgr., Wholesale Parts
J. M. Magliochetti	-	Product Mgr., Wholesale Parts
K. M. Sharp	-	Planning Mgr., O. E. Service
I. L. Metsker	-	Product Mgr., O. E. Service
R. J. Turner	-	Planning Mgr., Parts Craft
D. A. Herrington (Engine Parts)	-	Product Mgr., Parts Craft
W. F. Yarde (Chassis Parts)	-	Product Mgr., Parts Craft

HAYES DANA LTD.

C. O. Robbins	-	Sales Operation Mgr.

VICTOR GASKET DIV.

B. R. Basile	-	General Mgr.
L. G. Stohler	-	Div. Sales Mgr.
S. M. Lillis	-	Div. Chief Engr.
H. E. Dehr	-	Plant Mgr. Robinson
M. D. Blaho	-	Supvr. Application Eng.
C. I. Hayden	-	Supvr. Materials Eng.
L. F. Pyle	-	Acting Supvr. Development Eng.
J. F. Feldmann	-	Account Mgr. Sales

PROGRAM & SCHEDULE

TIME	PHASE
9:00 AM to 9:20 AM	1. Introductory Meeting (Executive Conference Room) a) Kickoff - S. M. Lillis b) Welcome - B. R. Basile c) VICTOR SPD Relationship - L. G. Stohler d) Program Plans - S. M. Lillis
9:30 AM to 10:30 AM	2. Tour of Materials Engineering Lab. - C. I. Hayden
10:30 AM to 10:45 AM	3. Tour of VICTOCOR & VICTOLENE Operations
10:45 AM to 11:30 AM	4. Tour of Development Engineering Lab. - L. F. Pyle
11:30 AM to 11:45 AM	5. Tour of New Tool Room Facilities
12:00 M	6. Luncheon - Oak Park Arms
1:30 PM	7. Product Meeting (Executive Conference Room)
1:30 PM to 1:50 PM	a) New Soft Gasket Product Development - C. I. Hayden 1) Cork-Rubber Demonstration - C. I. Hayden
1:50 PM to 2:05 PM	b) Cork-Cork Rubber Marketing - J. F. Feldmann
2:05 PM to 2:20 PM	c) New Hard Gasket Product Development - C. I. Hayden
2:20 PM to 2:35 PM	d) Development Engineering Program - L. F. Pyle

2:35 PM to 3:00 PM — e) Application Engineering Activity - M. D. Blaho

3:00 PM — 8. Service Parts Division

a) Market Needs (E. P. Breneman, K. M. Sharp, R. J. Turner)

b) Product Needs (J. M. Magliochetti, I. L. Metsker, D. A. Herrington)

c) Product Problems - Open

4:00 PM — 9. Wind-up - S. M. Lillis

GASKET ENGINEERING

The Engineering Department at VICTOR GASKET DIVISION - DANA CORPORATION is composed of 3 separate, yet interrelated groups:

1. Materials Engineering
2. Development Engineering
3. Application Engineering

Each group has its own specific responsibilities, yet each one is dependent upon the other for the exchange of information, co-operation and technical services.

As a whole, Engineering is basically responsible for new products and improvements in present products. The term products encompasses materials and gasket designs. As such, Engineering works closely with Sales and all phases of Manufacturing.

VICTOR is in a strong position for Engineering to develop and introduce new products because we have our own manufacturing capabilities to make several of our own proprietory materials. We have manufacturing capabilities to apply Engineering developed coatings to enhance or improve the sealing ability of gaskets.

In addition, VICTOR Engineering has developed a technical competence in gasket designs and the application of those gasket designs, that is recognized and acknowledged both in the States and abroad.

It is the responsibility of Engineering to maintain that leadership position. One very important factor in this endeavor is the need to work closely with Customer Engineers. By regular and constant contact, with and through Sales, Engineering becomes aware of product needs as Customer Engineers place more demands on sealing products with their new engine designs.

As this situation applies to the O.E. Market, so it applies to our Service Parts Market. There are product needs in the aftermarket which VICTOR can supply or can develop the capabilities to supply.

By establishing Co-operative Meetings between VICTOR Engineering and Service Parts Engineering, we can exchange information, identify market needs and carry out product programs that will be mutually beneficial to both Divisions.

S. M. Lillis

S. M. Lillis

MATERIALS ENGINEERING

A. RESPONSIBILITIES

The Materials Engineering group is responsible for the development of materials, standards, and technical services for gaskets. In addition, information on new and competitive materials must be made available to concerned personnel.

B. FACILITIES & FUNCTIONS

To fulfill its responsibilities, Materials Engineering maintains a Pilot and Test Laboratory. The Pilot operation is equipped to make many of our standard products on a small scale. The equipment has been designed to have greater flexibility in control than our manufacturing facilities in order that we may evaluate non-standard materials.

Our VICTOPAC mill will make sheets large enough for sample gaskets, yet small enough to permit wide variation in sheeting technique to provide methods for making the best possible sheet.

We have experimental capability for making ASBESTOPRENE, VICTOLEX, and similar products which are referred to as beater treated materials. Many of these products are combined with perforated steel core for use in cylinder heads and manifolds. We have, therefore, developed an experimental capability for such sheets. This calender can be operated at a variety of roll speeds and temperatures and is also used for calendering many soft packing materials.

The two-roll coater is used in the development of coating materials. Coatings are used as sealants, release agents, and adhesives for various applications. Our unit provides capability for single side coating, variable speed, and working with very small quantities of coating.

Our Test Laboratory is equipped to perform many specialized tests to evaluate and identify gasket materials. One of the major instnuments used is the Instron Tester. This device is capable of applying loads of up to 10,000 pounds in either tension or compression at temperatures ranging from -100°F. to +600°F. These loads may be applied at different rates, cycled, held, or modified automatically with a complete record made of the stress-strain relationship on a chart in the unit.

Relative sealing characteristics are measured in a standard fixture where both flange loading and internal pressure may be closely controlled. Standard compressibility under fixed loads is conducted routinely on most materials, and we have equipped the Laboratory with this unit.

Another major instrument which has proven valuable in identification problems is our infrared spectrophotometer. Accessories which accompany this device provide a unique capability for analysis and identification of gasket materials and coatings. Careful sample preparation together with some unusual techniques have given us the ability to measure heat history on many materials. Such capability provides an excellent tool in failure analysis and thus guides corrective action. Since the Division operates its own test engines, many pitfalls can be jointly identified and thereby corrected before they become problems.

Since many metals are used in gasket manufacture, we maintain a small metallurgical facility. This includes sample mounting, grinding, and polishing equipment; metallograph; and microhardness testing.

To facilitate the dissemination of information and control and issue standards and specifications, we maintain a Technical Services section. Through this area we maintain up-to-date files on pertinent customer, Federal, and Industrial specifications and standards. Engineering Material Specifications are developed and issued, as are Factory Standards governing

the manufacture of our base materials, and Purchase Specifications defining our raw materials. For general reference we maintain a cross reference file on competitive materials and VICTOR materials by customer specification so that we are aware of our competitive position.

Non-standard materials required for prototype orders are prepared here and may be obtained with physical properties if so desired.

C. NEW MATERIAL PROJECTS

The maintenance and improvement of our competitive position is largely dependent upon our ability to improve present and develop new materials. Many such programs are under way in the Materials Engineering Laboratories. Some of these are:

1. Hard (metal reinforced) Gaskets

a. VICTOCOR 500 - This material is built in the no-retorque design group. Its significance is in a continuous exposure heat resistance to 500°F., or 200°F. higher than its nearest relative.

b. VICTOCOR 170 - This material is being developed as a low cost, low gauge, steel-reinforced material to compete with beaded steel in cylinder head applications.

c. Thick VICTOCOR 300 is intended to bring no-retorque design capability to high gauge (.080"/.090") applications. It may also replace steel plates in heavy-duty engines.

d. Hi-Temp VICTOCOR (150) is expected to provide greater temperature resistance, but differs from VICTOCOR 500 in the maximum temperature anticipated and in the torque retention area. It will fill the temperature gap where the demands of application do not require the cost of a no-retorque gasket.

e. VICTOCOR 160 is a lower cost version of VICTOCOR 150. Its purpose is to help make us more competitive in this area.

f. Thick Aluminum Precote has been developed for beaded steel head gaskets in an effort to help our original equipment users eliminate the need for a sealant in their assembly. It has been successful in that effort.

2. Soft Packings

a. Carburetor Spacer Gaskets represent a large potential market which we have not tapped. The material here must not only seal, it must also provide thermal insulation and be inexpensive.

b. VICTOPAC 14 (Cat. 1E202) is now a reality. The product has been approved and production capability defined.

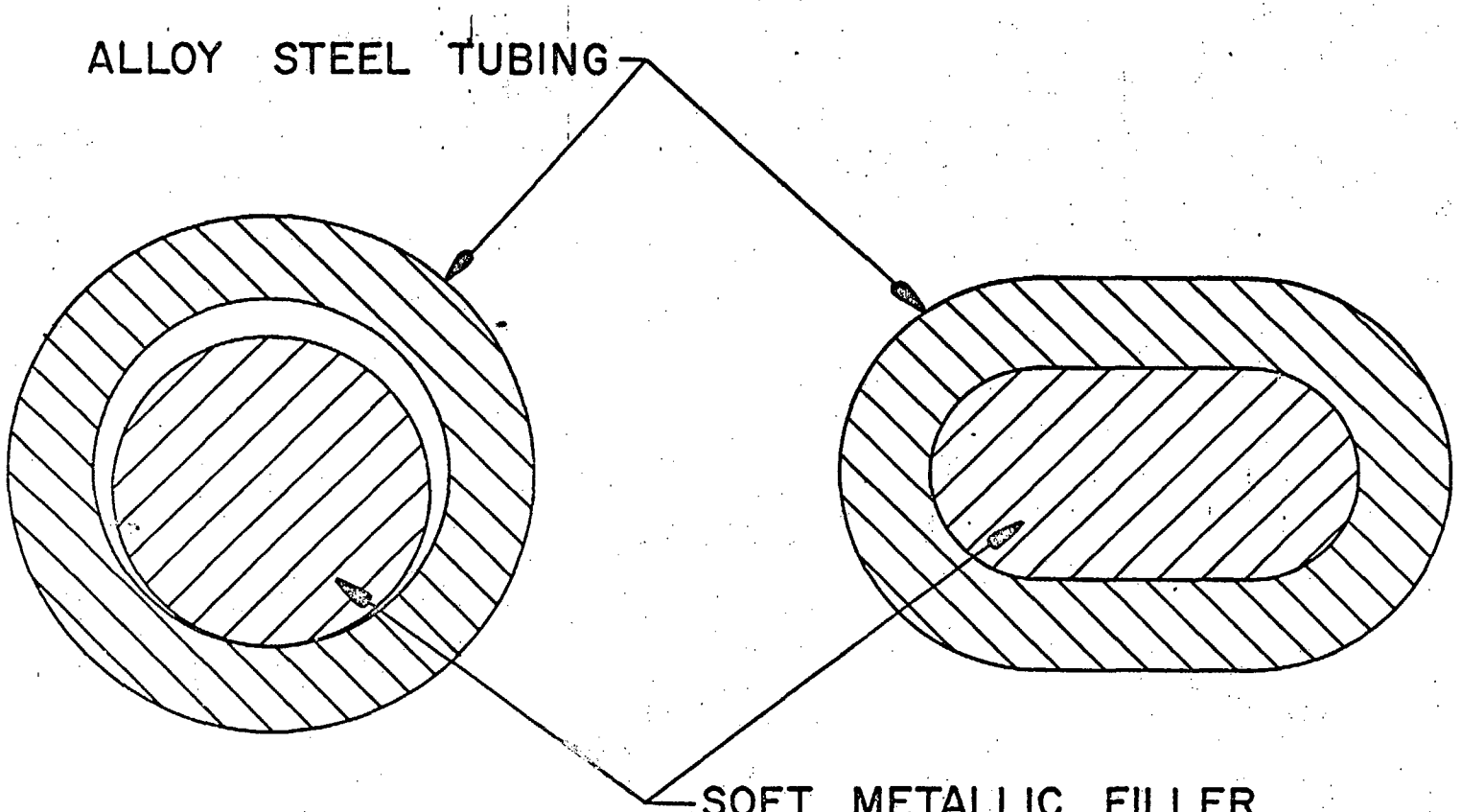
c. Cork-Rubber Gaskets, including rubber coated cork, represents another large potential market. We are working closely with manufacturing to develop materials and processes for production.

3. New Fire Ring Development

We are engaged in design and test of new fire rings to be used in combustion sealing of the new series of very high output diesel engines. Concepts such as filled tubing, aluminum and plastic fire rings are being studied.

L. F. Pyle

FILLED FIRE RING



AS MADE

INSTALLED IN ENGINE

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APPLICATION ENGINEERING

A) RESPONSIBILITIES

Broadly speaking, the responsibilities of this group may be defined as relating to the print of the product and the performance of the finished part.

The product drawing, of course, contains all the information required to fabricate the finished gasket and includes the contour necessary to fit the given application, the materials required to survive the given environment, and the dimensional tolerances that allow the product to be mass produced, yet function reliably on each and every customer application.

The performance of the finished part is predicated on the design of the gasket, its degree of acceptable manufacture, the dimensional trueness of the customer assembly, and the end use of our product. Any one or combination of these factors may cause product failure. It is the responsibility of this group to identify the specific cause(s) of failure and to either correct or solicit help in correcting these factors.

B) FUNCTIONS

In performing their responsibilities, the members of this group act as product design and development engineers. They analyze the performance requirements of the product and the environmental conditions under which the product must function. They select or design the lowest cost sealing components to survive the expected conditions for the required life of the product. They group and match the components to form a single, integral gasket design that can be made economically and function reliably.

After designing the gasket, and submitting a product drawing to the customer, prototype parts may be offered for trial. Should the testing indicate a product failure, analysis as to possible causes and corrective action is conducted.

C) PRODUCT DESIGN PROCEDURE

The first step in designing an acceptable gasket is determining the life required of the part and the environment to which it will be subjected. Among these environmental factors influencing the performance of the gasket are the total bolt load, bolt spring rate, bolt span, mating flange surfaces and strength, relative motion between mating surfaces, system vibrations, chemical and thermal reaction between the confined medium and the gasket, as well as the pressure of the confined medium. Since all of these factors can assume any number of values in a specific case, there are an infinite number of combinations possible. Each combination will allow only one best design: The one that survives for the required length of time at the lowest possible cost.

Obviously, then, each product is a custom design which is created to perform a function under a given set of boundary conditions.

D) CURRENT AND NEW DESIGNS

As a result of the specialized conditions for which gaskets are designed, many basic designs are in common use today and each has many variations. On the following pages are shown some cross sectional views of the more popular basic constructions used in both the automotive and heavy duty fields.

The metal layer-asbestos is an inexpensive gasket (FIG. 1) that may be used in automotive applications of generally light service.

Adequate space must be available for overlapped holes in the gaskets that must be designed oversize to allow for core shift in the engine liquid holes.

The VICTOCOR 150 gasket (FIG. 2), slightly more expensive than the metal layer-asbestos, is generally used where performance requirements tend toward moderate duty automotive service and where cylinder head surface finish requires the use of a composition gasket material.

The VICTOCOR 200 gasket (FIG. 3), somewhat more expensive than the VICTOCOR 150, is generally specified for the heaviest service encountered in the automotive field. This would include large bore, high performance gasoline engines.

The VICTOCOR 200 and RIGID FIRE RING gasket (FIG. 4) for heavy duty diesels is currently used in a few applications where our customers wish an improvement over what the STEEL PLATE GASKET offers. The rigid fire ring contributes the high strength characteristic of the plate gasket and the VICTOCOR 200 contributes the conformability and fluid resistance characteristic of the composition gasket materials.

Although engineering costs are high to develop the "island seal" type metal layer gasket (FIG. 5) for heavy duty diesels, it is normally specified where conditions are such that all available clamping force must be used for sealing purposes. Because of the deflections induced by localized loading, this design is used only where structural strength and stiffness are great.

The VICTOCOR 300 and YIELDABLE FIRE RING gasket concept (FIG. 6) is used in the heavy duty diesel market where "no retorque" is a re-

quirement and service duty is severe. This concept utilizes the low relaxation properties of the VICTOCOR 300 composition gasket body and the highly yieldable characteristics of the soft iron wire fire ring. In this manner, variations in cylinder liner stand-out can be accommodated with only minor variations in combustion sealing load.

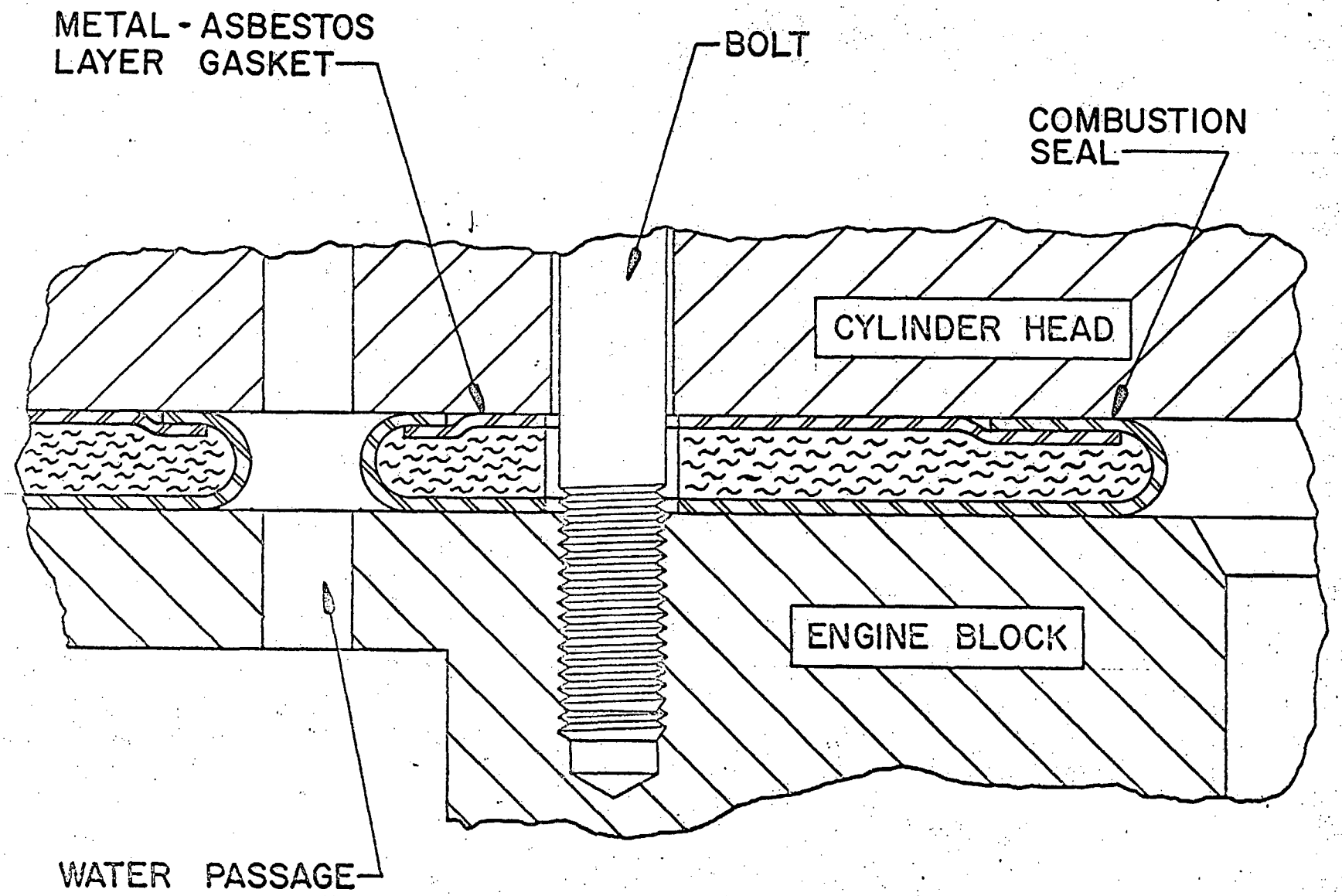

FIG. 1

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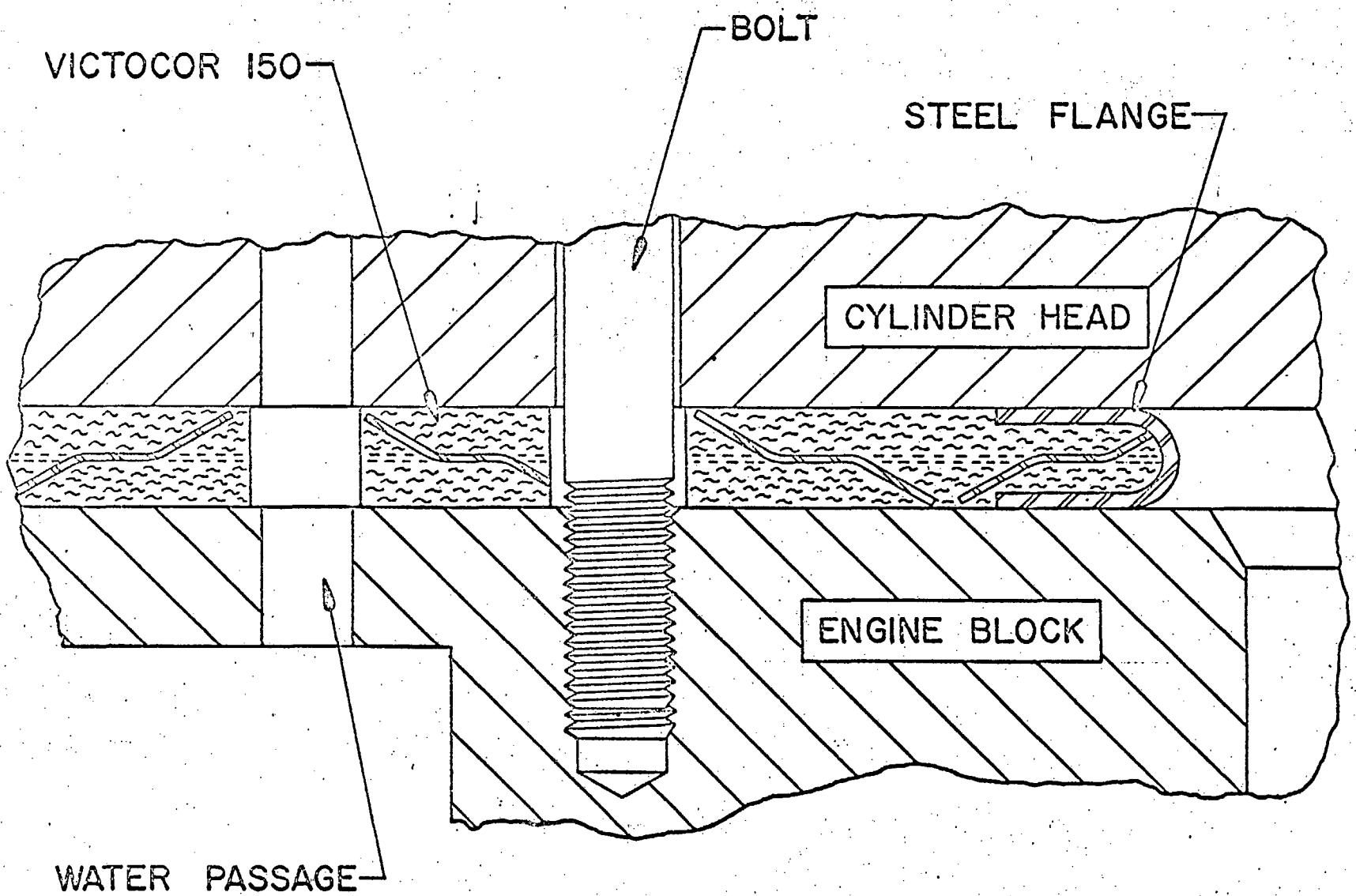

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FIG. 2

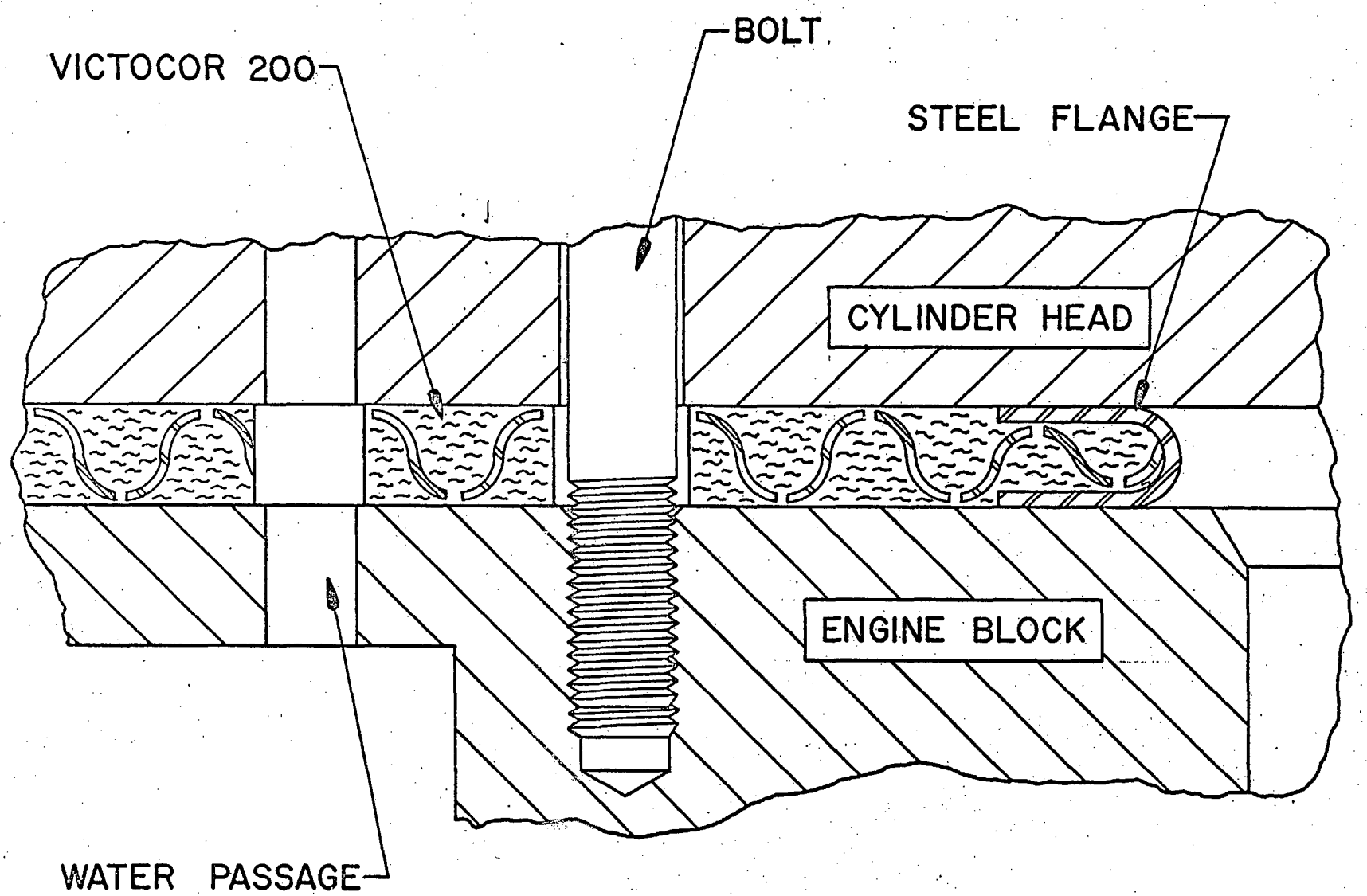

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FIG. 3

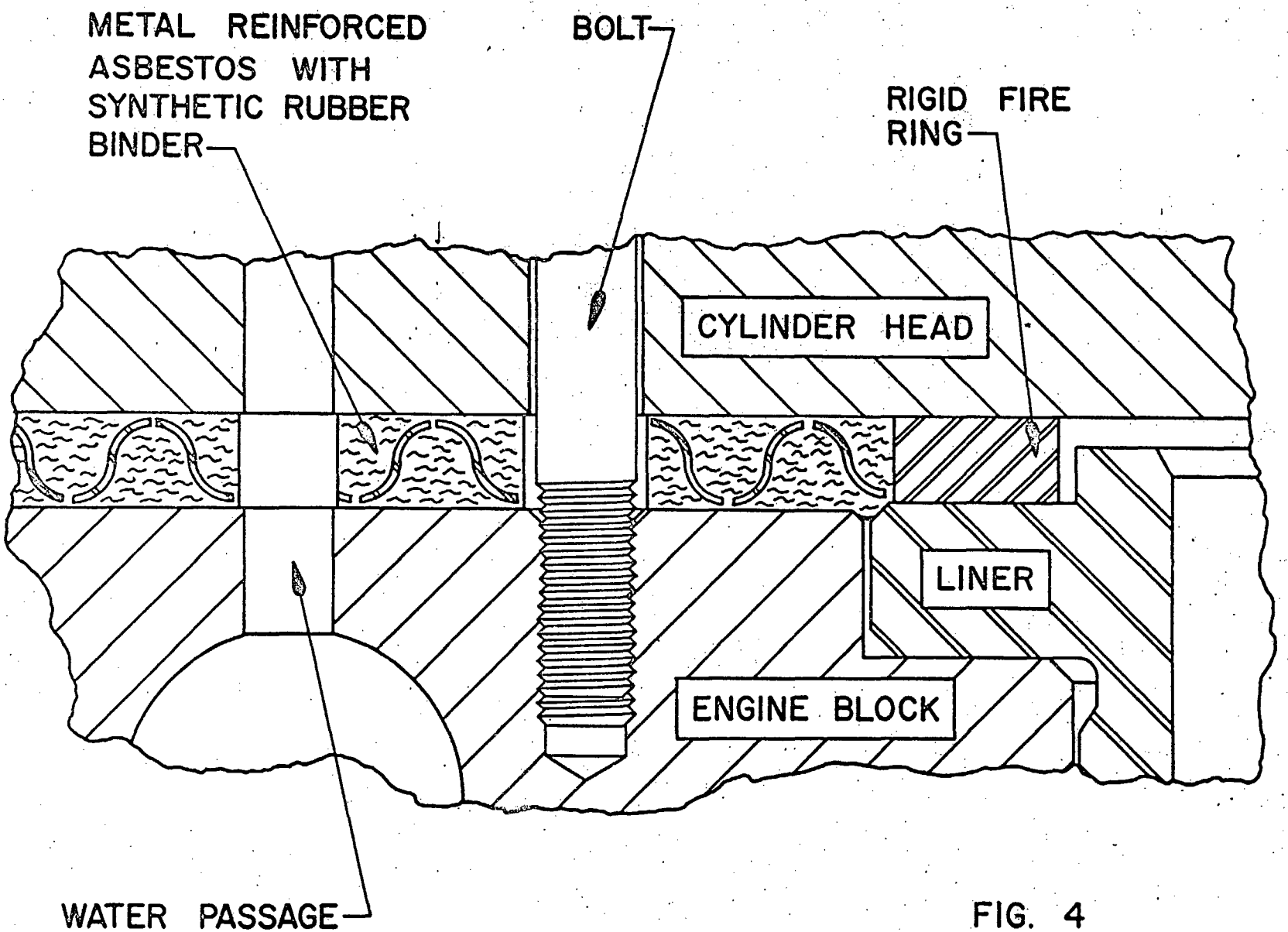

FIG. 4

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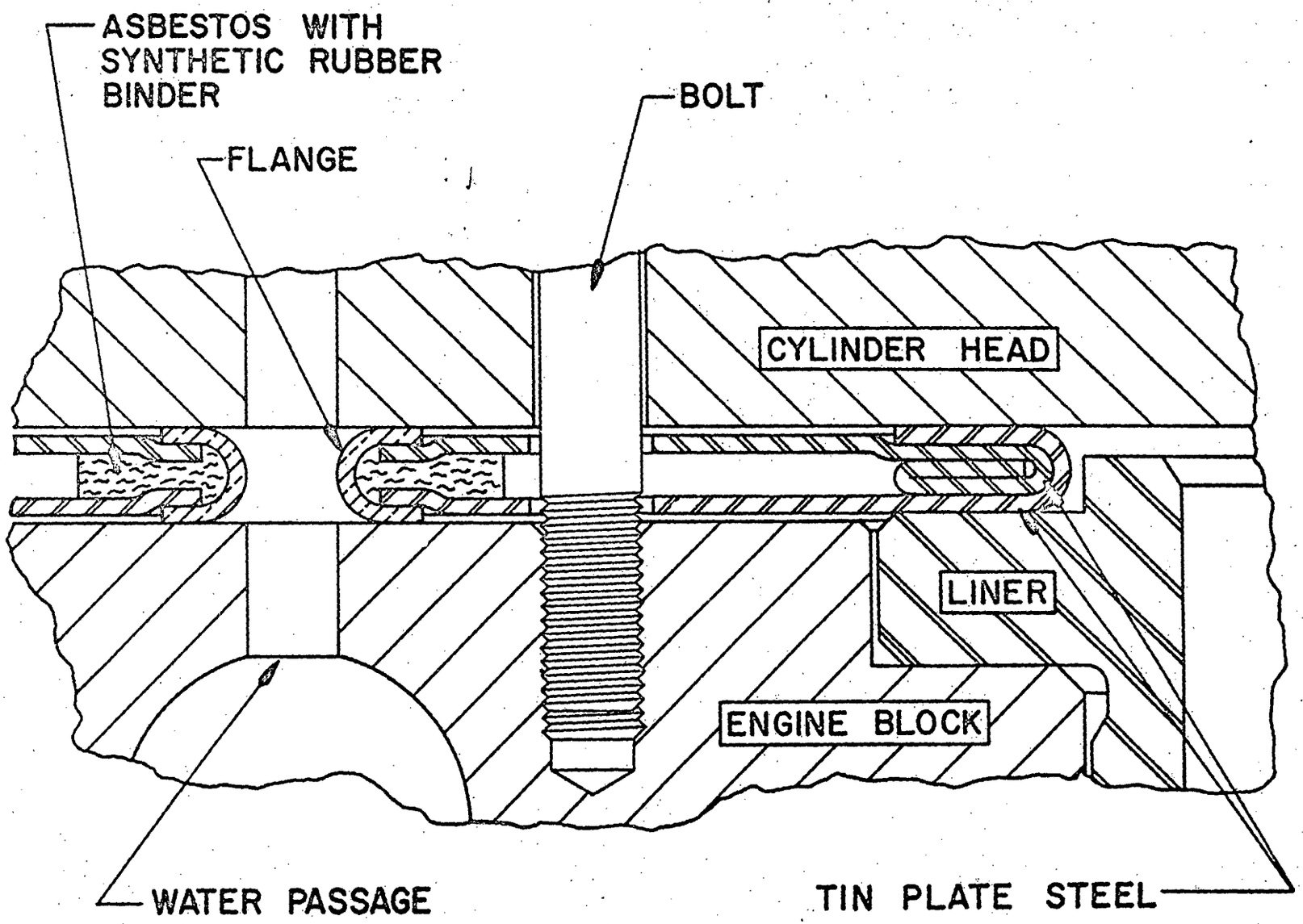

FIG. 5

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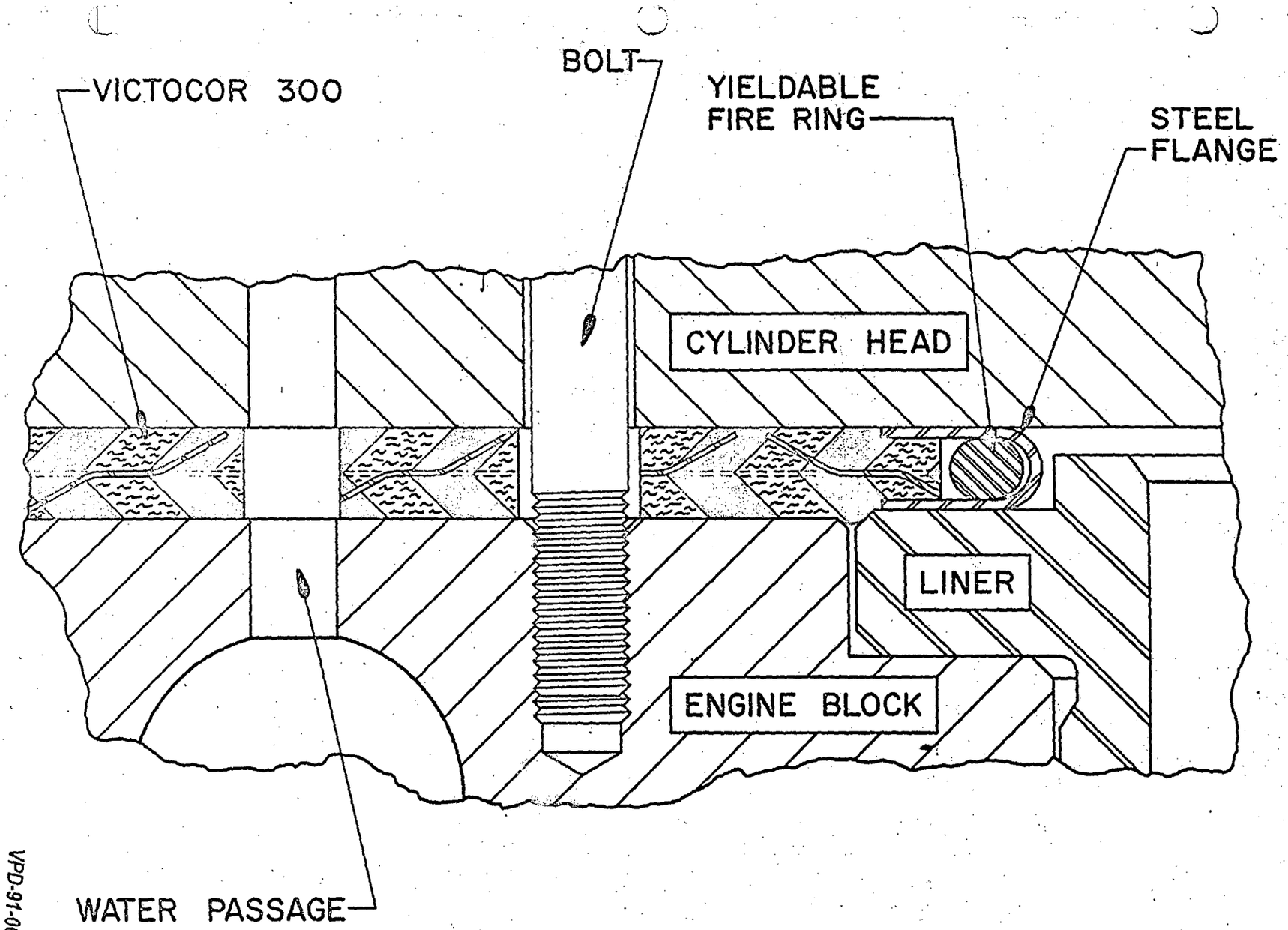

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FIG. 6

VICTOR GASKET ENGINEERING
DANA SERVICE PARTS DIVISION
CO-OP MEETING
CHICAGO - October 27, 1969

(2) HARD GASKETS

(a) Problems with old line gaskets

(b) Problems with current gasket designs

(c) Needs for new gasket designs

(d) Specification problems

VICTOR GASKET ENGINEERING
DANA SERVICE PARTS DIVISION
CO-OP MEETING
CHICAGO - October 27, 1969

(1) SOFT GASKETS

(a) Problems with current materials

(b) Needs for new materials

(c) Design problems

(d) Segmented gaskets

(e) Specification problems

NOTES

NOTES

d. Beater-Treated Continuous VICTOPAC is an effort to provide VICTOPAC characteristics in a continuous coil for operating economy.

e. Low Cost VICTOPAC 65 is to provide this premium grade material at a reduced cost without sacrificing any quality.

f. Low Cost VICTOPAC 1 is a parallel to the above in this grade product. Again, maintenance of quality is paramount.

g. VICTOPAC 100 is a premium high temperature material. Its principal use is VICTOCOR 500, but it is available as a soft packing.

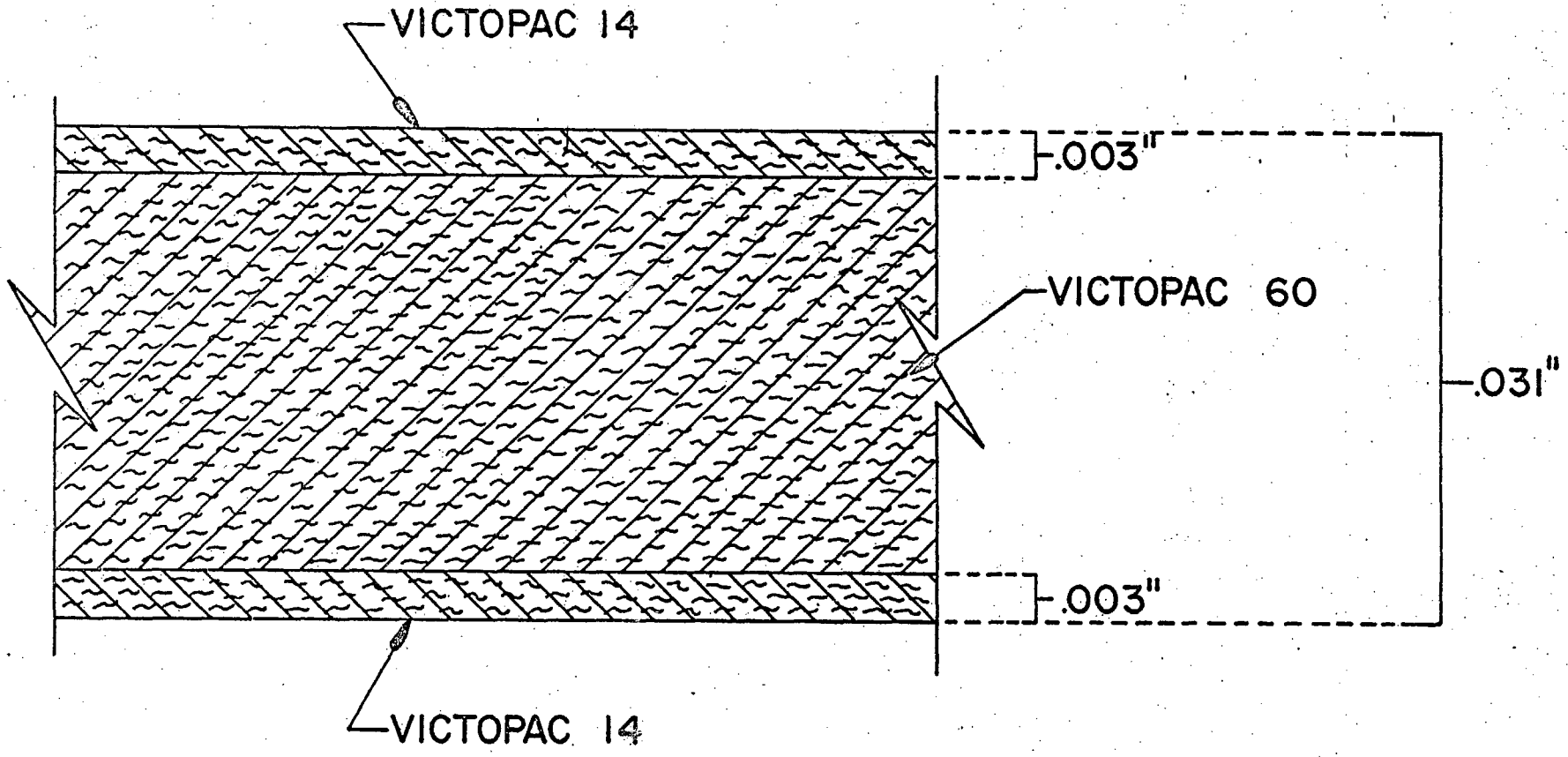
h. VICTOPAC 14-60-14 is a composite product which will provide improved sealing characteristics without significant loss of fluid resistance.

i. ASBESTOPRENE PA and ASBESTOPAC PA are planned to provide some increased heat resistance in higher compressiblity areas.

These projects along with a number of preliminary evaluations on new materials, concepts, and test methods constitute a very ambitious program being conducted by Materials Engineering.

Carl Hayden

pt C. I. Hayden



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VICTOPAC 14-60-14

August 29, 1969

Victor

TO: J. M. Beeson
J. D. Buescher
C. H. King
M. Kinsey
J. J. Rokos
L. J. Smagatz
C. C. Ulfig
C. W. Watrous

CC: L. G. Stohler
J. R. Derpack
H. Dehr
G. W. Phillips

SUBJECT: CORK - CORK/RUBBER PARTS

Attached is a listing of tooling purchased from Mundet. In addition to these numbers, there are twelve dies that have not been identified at this time. A supplimental list will be sent as soon as these are identified.

Will you please start now to solicit business for these and similar parts at your accounts. Please obtain current prints on the parts, an estimate of volume and determine if the part is production or service. Obviously, any competitive information would be welcome. Send this information to me.

I will review the parts, and with your help, select those desirable items we want to go after. If necessary, we can quote on all parts, but we want to concentrate on those that best fill our needs for volume and profitability. Wherever possible, we will use information obtained from O. E. Service and Churubusco as a guide in pricing the parts. Quotations will be sent to you for submission and negotiation with your accounts. While many contracts have already been let, we have had indication that business is available as a second source or on a spot buy basis.

As a guide, the following would be our probable preference for business:

1. Cork and rubber
2. Latex coated fiber
3. Latex coated cork
4. Cork

This is an extremely important project and I'm sure I can count on your help.

J. F. Feldmann

Enclosure
lrs