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THE JOINT EXAMINATION BOARD

PAPER P3 – Preparation of Specifications for United Kingdom Patents
Thursday 3rd November 2011

10.00 a.m. – 2.00 p.m.

Please read the following instructions carefully. ***Time Allowed – FOUR HOURS***

1. The whole question is to be attempted.

2. Marks to be awarded are given at the end of the question.

3. Please note the following:

   a. Enter the Paper Number (P3) and your Examination number in the appropriate boxes at the top of each sheet of paper;
   b. The scripts are photocopied for marking purposes. Please write with a **dark inked pen** on one side of the paper only and within the printed margins, and do not use highlighters in your answer;
   c. Do not state your name anywhere in the answers;
   d. Write clearly, examiners cannot award marks to scripts that cannot be read;
   e. You must number all the pages of your answer script. Once the exam finishes, an additional 5 minutes will be allowed for you to do this.

4. Under the Examination Regulations **you may be disqualified from the examination and have other disciplinary measures taken against you if**:

   a. you are found with unauthorised printed matter or other unauthorised material in the examination room;
   b. your mobile phone is found to be switched on;
   c. you copy the work of another candidate, use an electronic aid, or communicate with another candidate or with anyone outside the examination;
   d. you continue to write after being told to stop writing by the invigilator(s). **NO WRITING OF ANY KIND IS PERMITTED AFTER THE TIME ALLOTTED TO THIS PAPER HAS EXPIRED.**

5. **At the end of the examination assemble your answer sheets in question number order and put them in the WHITE envelope provided**. Do not staple or join your answer sheets together in any way. Any answer script taken out of the examination room will not be marked.

6. This paper consists of 7 pages, including this page, and comprises 2 pages of the question, 2 pages of client's drawings and a further set of the drawings for use in your answer.

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In this question you are asked to draft a specification for filing at the UK Intellectual Property Office with a view to obtaining a UK patent. You should assume that the client's description of the prior art is complete. You should not take into account any other prior art which might be known to you. You should also assume that the client's description of the device and its operation is accurate, i.e. that the device works as described. The allocation of marks is given at the end of the question.

Your client sends you the following instructions

Dear Pat

What you are seeing in the drawings is a device for controlling the leakage of drilling fluid when the drilling string in an oil well is disconnected.

An oil well drilling string normally comprises steel tubes each about 12 metres long and 4 inches outside diameter (about 100mm.). These are screwed together to form a continuous length and new tubes are added as the drilling goes deeper. When the drill bit is to be changed, etc., the drill string has to be removed from the drill hole. As is usually the case in industry, certainly the oil industry, the time taken to add or remove pipe strings is very costly and needs to be minimized. Typically, to save time, strings are disconnected in threes, i.e. lengths of about 36 metres at a time.

In the string removal process, on land or at sea, the string is gripped by static holding tongs below the joint to be unscrewed and a "work tong" grips the pipe length above the joint and unscrews it.

Now the string will normally contain drilling fluid used among other things for lubrication and debris removal. The fluid is usually a special liquid 'drilling mud'. Believe it or not this fluid is expensive so it's desirable to recover it. Anyway it is quite undesirable to allow it to shoot out upon release of a pipe string, when it might cause injury, or even merely to pollute the surrounding work area. A string length of 36 metres with a bore of about 2.5 inches (about 60mm) contains a lot of fluid.

There is a device, described in GB2264965, which does the job. The attached figures 1 and 2 illustrate it. It has a three sided box sleeve 5a, b, c with top and bottom neoprene seals 20a, b, while bladders 10 are arranged in the sleeve to be inflated by compressed air from the valve 30. The seals 20a, b are split so that they can be fitted around the lowermost joint where the pipe string length is to be disconnected. A duct 50 is arranged for draining the cavity in the sleeve 5. You will understand that as the pipe string is unscrewed it rides up through the upper seal 20a. When the string is separated, the drilling fluid flows into the cavity and drains via the duct 50 into a reservoir.

This prior device is quite complex and expensive to manufacture, and it needs a compressed air supply. The box needs to fit between the tongs. The spacing between the tongs can vary a bit and sometimes they are too close together. Even worse, sometimes the upper pipe pulls out of the box as it is being unscrewed and so the drilling mud goes everywhere. The device shown in our drawings comprises a collector having an impervious flexible outer skin of reinforced neoprene which extends between top and bottom rigid metal plates to form the

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box sleeve. This is filled with open pored foam, which can be formed by foaming in situ. A wavy line join is cut in the foam so that the baffle effect of the foam is maintained to stop the mud escaping out of the front of the device. The collector drains into a drain duct. The foam need not completely fill the volume between the end plates. Ideally there are collector ducts formed in the foam to lead to the drain duct so that the mud can flow out quite quickly.

Once the holding and working tongs have gripped the pipe either side of a joint, the device is squeezed sideways over the pipe, between the tongs, the pipe passing through the entry "V". The device can expand as the upper string is unscrewed and the tongs separate vertically. Upon separation of the tubes, the mud flows into the foam which baffles it sufficiently to prevent emergence via the "V" or the gaps in the end plates in which the drill string sits. The mud exits the foam into the drain duct. The foam has to be flexible and is preferably springy.

You can see that using foam conveniently serves several different purposes. The foam can be compressed to squeeze the collector between the tongs. As the tongs move apart, the foam expands so the collector stays firmly around the two ends of the pipe string. But the foam also forms a good seal around the circumference of the tubes and the slit is easily opened up to push the collector over the pipe string.

We could just put coil springs between the end plates to expand the device as the pipes are unscrewed and the tongs move apart.

We could still use inflatable bladders to maintain the seal at the front of the device as they would accommodate the axial expansion, but we don't want to do that. A better way is to fasten the outer skin over the entry "V", by buckles or 'Velcro' straps for example, to keep the foam halves together, but in fact we haven't found this to be necessary if we use a stiff enough foam.

Will you please get an application filed today. I am quite excited about it as I am sure a collector like this has not been made before and the way we use it is certainly new. I am just off to South America with a drill rig operator so I will be able to discuss my new idea with him on the 'plane.

Best wishes

Red.

You are to draft a specification for filing as a UK patent application at the United Kingdom Intellectual Property Office, including an Abstract and Claims.

Marks will be allocated as follows:

Claims 60

Introduction and Description 35

Abstract 5

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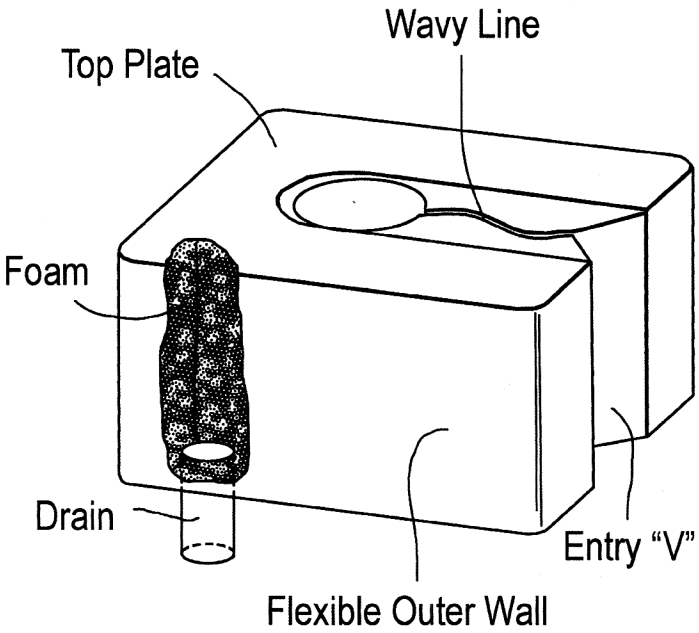

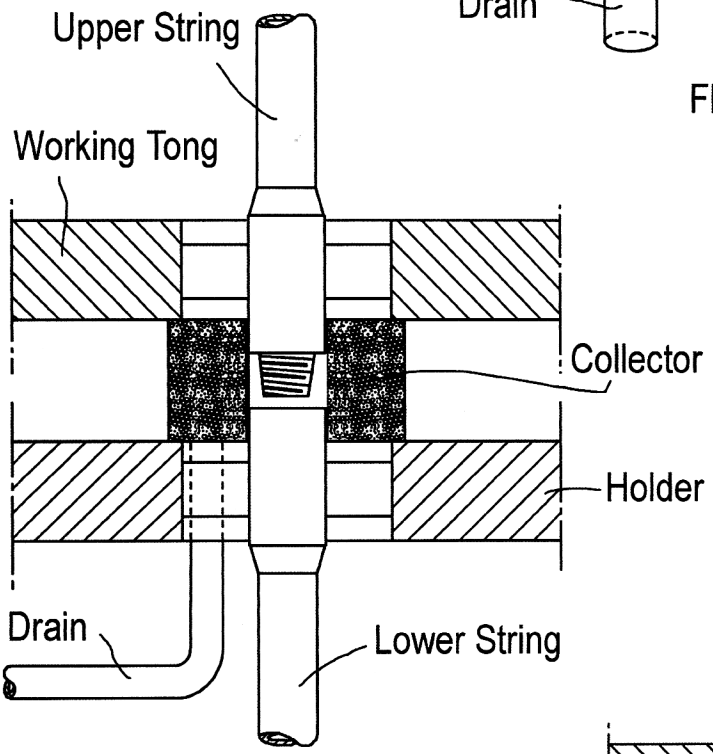

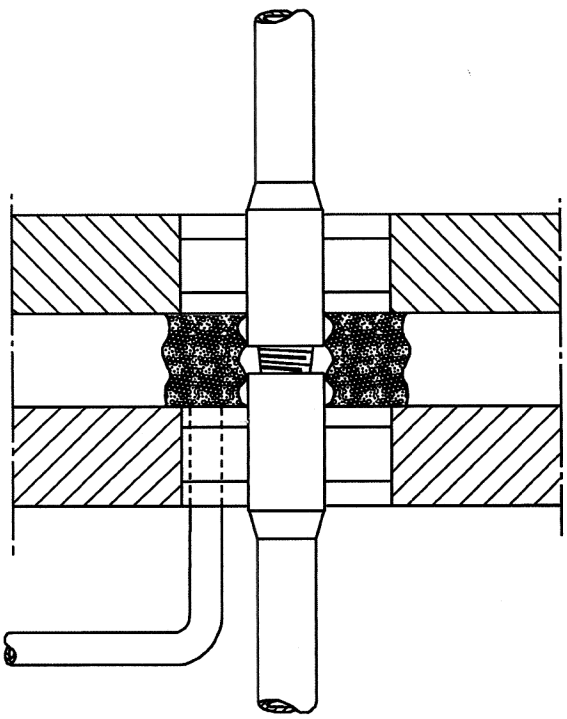

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Fig.1
Prior Art

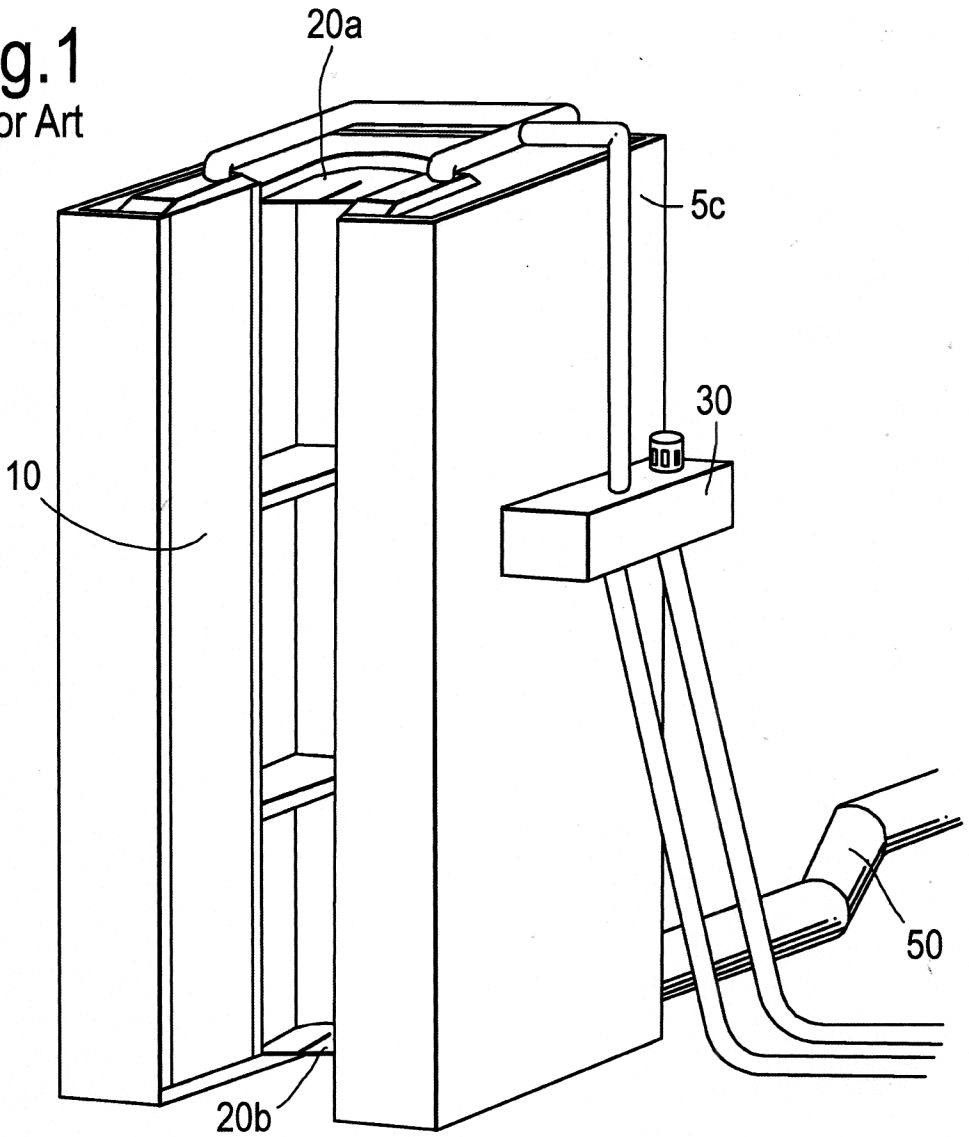
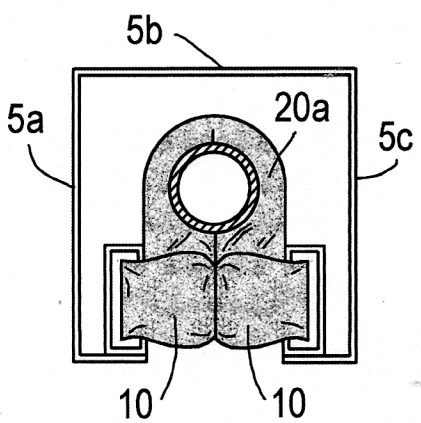


Fig.2
Prior Art



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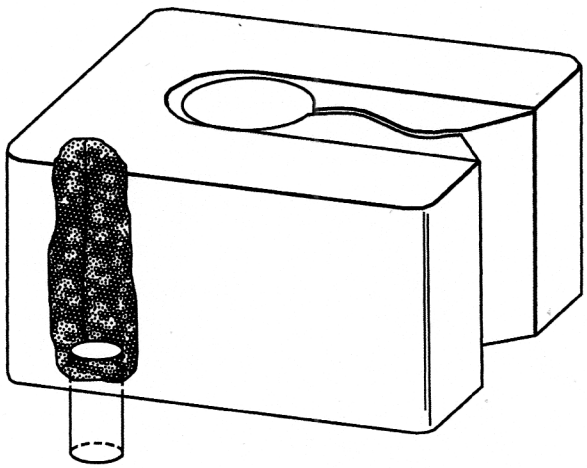

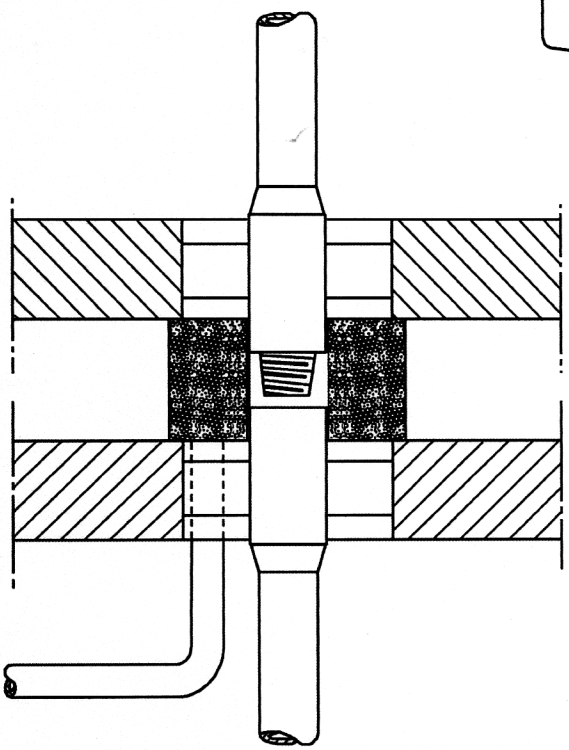

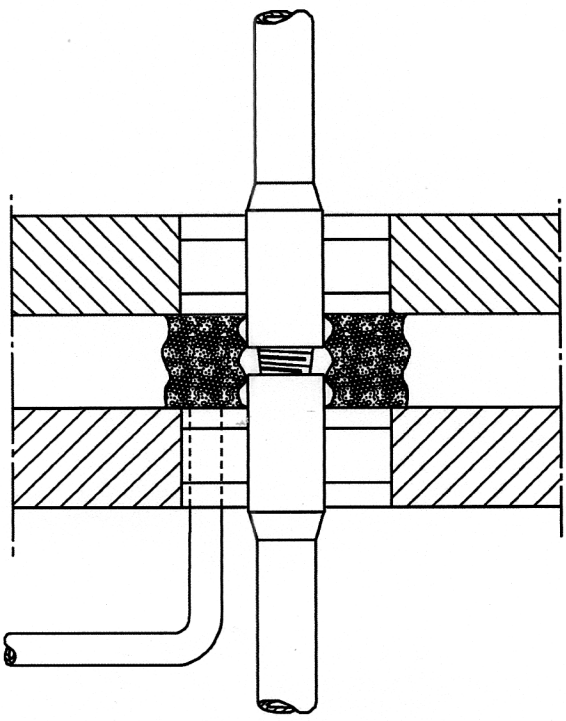

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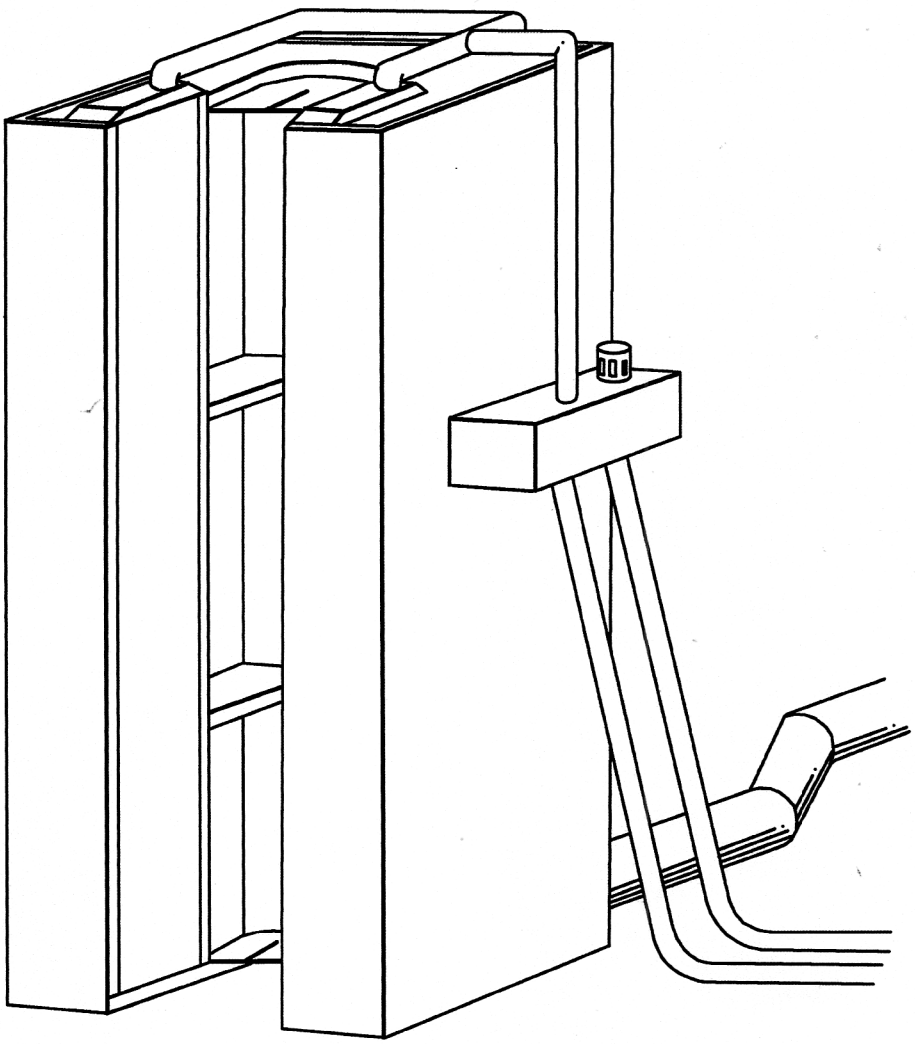

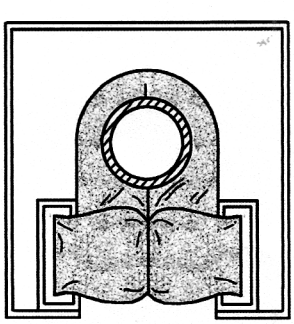

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