United States Patent

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[54] **DIE FOR PREPARATION OF FUSED SALT DISCS FOR INFRARED SPECTROSCOPIC ANALYSIS**
4 Claims, 1 Drawing Fig.

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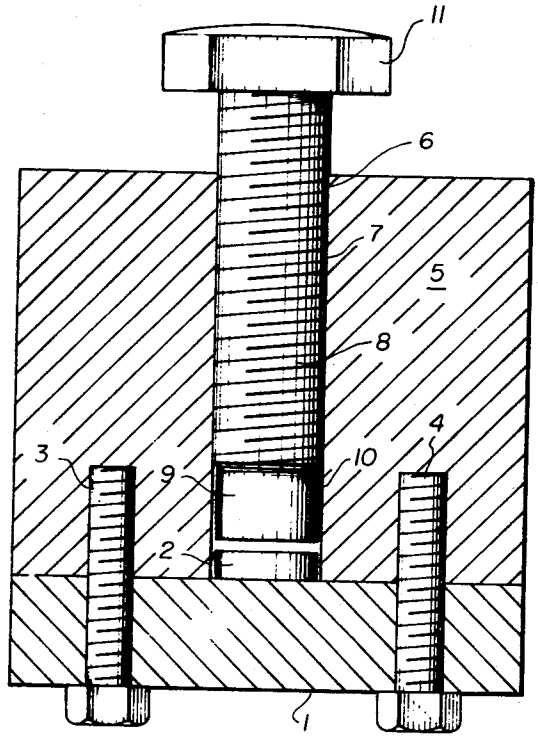
[56] **References Cited**

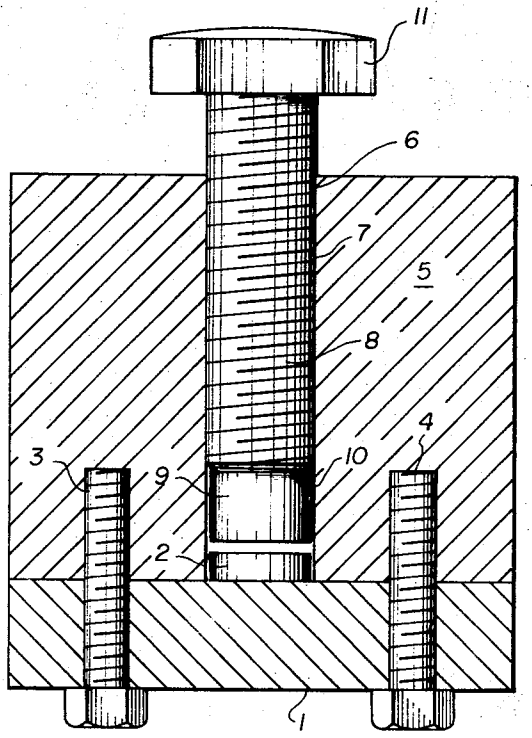
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ABSTRACT: An improved die for use in casting of fused impregnated discs for infrared spectroscopic analysis, particularly where air and moisture are a problem. The improvement resides in the combination of a removably fastened base on a threaded die body and a single threaded plunger to fit the bore of the die. When the base is fastened to the die body, it acts as a supporting structure for an anvil seated at the bottom of the threaded die bore. In operation the impregnated salt to be pelleted is introduced into the threaded die bore onto the anvil positioned at the bottom of the bore, being secured in the bore by the fastened removable base. The plunger is thereafter screwed into the threaded bore until sufficient pressure is applied to produce a salt disc or pellet between the anvil and the plunger. The base is then removed and by turning the plunger a few more times, both the anvil and the fused disc are ejected from the die.





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DIE FOR PREPARATION OF FUSED SALT DISCS FOR INFRARED SPECTROSCOPIC ANALYSIS

BACKGROUND OF THE INVENTION

Fused salt discs, generally prepared from a relatively transparent salt such as potassium bromide, are used in the determination of infrared spectra of materials only slightly soluble or insoluble in most solvents. A small amount of material to be examined is intimately mixed with a large quantity of the salt. The mixture is compressed into a thin fused disc and the disc is then examined spectroscopically.

There are two types of apparatus generally used for compressing these salt discs. One of these requires a hydraulic press; the other utilizes two opposed screws which are tightened against each other. In the first type, a die body with a smooth cylindrical bore, closed at its lower end by a removable cylindrical flat surfaced anvil, coacts with a close-fitting plunger. The required amount of salt mixture is charged into the bore and the plunger, being slightly longer than the die body, is inserted into the bore. The device is placed in a hydraulic press which forces the plunger further toward the anvil. The salt mixture is compressed between the plunger and anvil into a fused disc.

The disc is removed by removing the anvil and forcing it out of the bore by bringing pressure on the plunger. This procedure is cumbersome because of the need for working successively in and out of a dry box or installing a hydraulic press within the box, when working with sensitive materials.

In the second type of die, two opposing bolts are tightened against each other within a die body. A salt mixture retained within the bore is progressively compressed between the two bolts, as the bolts are wrench tightened to form the disc. When the bolts are removed, a disc which cannot be removed without breaking will have been formed within the threaded bore. The disc must therefore be retained within the die body and placed in the infrared spectrograph so that the infrared beam may pass through the threaded bore and the disc within. Although this device has the advantage of being operable without resorting to a hydraulic press, it has the disadvantage that it is not practical where the sample must be protected from the atmosphere.

SUMMARY OF THE INVENTION

According to the present invention an improved die is made available particularly for use with salts which are sensitive to air, moisture or both. The present die is comprised of a threaded bore adapted to receive a threaded plunger having a smooth flat bottom surface and a corresponding cylindrical anvil which is secured at the bottom of the die bore by a removable base plate.

The salt to be fused is charged into the bore, onto the surface of the anvil. It is then compressed into a disc by the pressure of the tightened plunger, using an ordinary wrench to tighten the plunger, rather than a hydraulic press. After the disc is formed, the base is unfastened and removed and the anvil and disc are removed merely by giving the plunger an extra turn or two. The plunger, of course, is at least slightly

larger than the length of the die in order to eject the disc. The disc is then placed in a sealed holder for spectroscopic examination.

A preferred embodiment of the improved die of this invention consists of a die body having a threaded bore terminating in a smooth collar at its lower extremity having a diameter at least slightly smaller than the diameter of the threaded bore, adapted to slideably receive a corresponding smooth cylindrical shank which continues as the lower extremity of the plunger, and also retain an anvil therein of similar diameter as that of the smooth shank.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the attached drawing of a preferred embodiment a removable base plate **1** holds an anvil **2** in place; bolts **3** and **4** secure the base plate to the die body **5**; the bore **6** is threaded **7** and adapted to accept the threaded plunger **8**. The lower extremity of the plunger is a smooth cylindrical shank **9** slideably fittable into a smooth collar **10** of the bore **6**; the bottom of said shank **9** meets flush with the upper face of the anvil **2** of corresponding diameter, when the plunger **8** is tightened by turning the plunger head **11**.

As can be seen from the embodiment in the drawing, the die is simple in structure and may be used in a typical laboratory without elaborate manipulation.

The die of this invention makes use of the pressure of a turning screw to produce the salt disc, obviating the need for a hydraulic press. Additionally, the use of this die in compressing a salt disc does not require application of pressure for up to ten minutes as with a hydraulic press. The finished disc is compressed rapidly and easily removed without cracking or breaking, since the screw plunger operates smoothly and evenly in the die. Furthermore, it affords a simple inexpensive unit for ordinary laboratory use to prepare fused salt discs for infrared spectroscopy.

The base plate may be fastened by bolts, clamps and other known means. This plate may be constructed with a built-in anvil to fit the inner bore of the die.

Having thus described my invention, I claim:

1. An improved die for use in casting fused impregnated salt discs containing a material for infrared spectroscopic analysis comprising:

a. A base plate removably fastened to close one end of a die body, said die body having a threaded bore.

b. A threaded plunger adapted to be engaged with the above threaded bore said plunger being slightly longer than the length of said die body and having a flat smooth bottom surface.

c. An anvil snugly but removably fittable within said bore, and secured therein by said removable base plate.

2. An improved die assembly as in claim **1** wherein said base plate is fastened to said die body by bolt means.

3. An improved die assembly as in claim **1** wherein said anvil is an integral part of said base plate.

4. An improved die assembly as in claim **1** wherein said threaded die terminates in a smooth collar at its lower extremity and said plunger terminates in a corresponding smooth cylindrical shank slideably receivable within said collar.