Nov. 21, 1944. O. G. FERRIER 2,363,406

ENCASEMENT FOR WIRE DRAWING DIES

Original Filed March 31, 1941

Fig. 1.

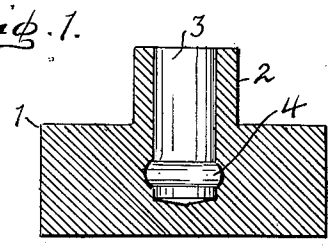


Fig. 3.

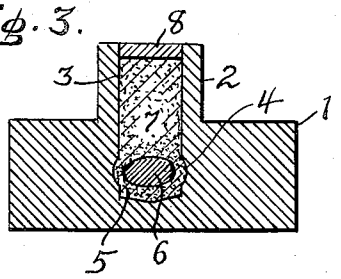


Fig. 2.

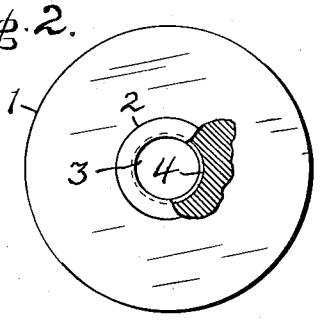


Fig. 4.

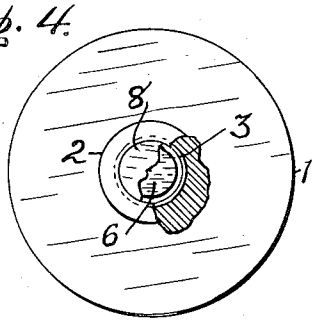


Fig. 5.

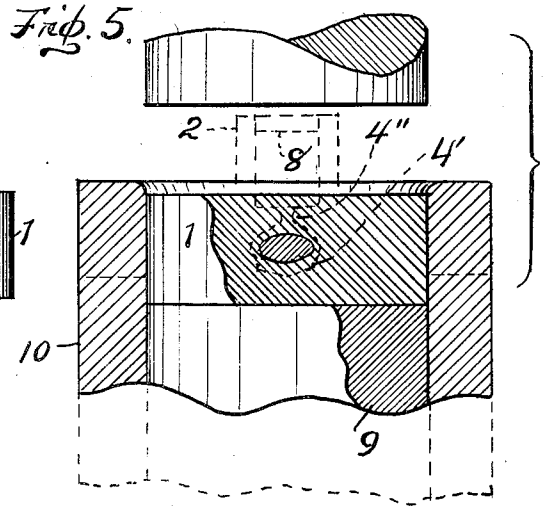
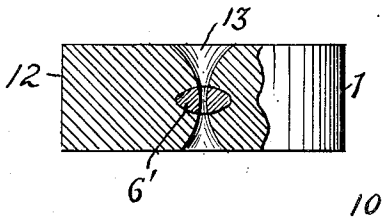


Fig. 6.



Otis G. Ferrier INVENTOR.

BY J. G. Burns

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UNITED STATES PATENT OFFICE

2,363,406

ENCASEMENT FOR WIRE DRAWING DIES

Otis G. Ferrier, Fort Wayne, Ind.

Original application March 31, 1941, Serial No. 386,023. Divided and this application May 13, 1943, Serial No. 486,806

3 Claims. (Cl. 205—29)

This invention relates to an encasement for wire drawing dies similar in character to that disclosed in my previous application filed March 31, 1941, Ser. No. 386,023, of which this application is divisional, and pertains to that type of die structure in which a highly refractory die body, such as a diamond, is confined firmly within an encasement formed of a metal or alloy characterized by its hardness and great resistance to internal displacement at normal temperature, the purpose being to establish the refractory die body definitely in a state of fixity in a predetermined position within an encasement in a manner to afford substantially unyielding support by the casing for the die body wherefore to circumvent expansion of the body in any direction.

Ordinarily, in use of a die structure of this character, the die body is subjected to outward radial pressure and also force in the wire-drawing direction during passage of a wire therethrough, and is also subjected to great frictional heat occasioned by the working of the wire as it is drawn through the die body and attenuated during the drawing operation. The stress imposed upon the die body, unless completely supported uniformly and rigidly restrained from expansion, frequently results in fracture of the die body which renders it useless. It is therefore the purpose of the present invention to provide an encasement for a die body and an investment therein wherefore fixation and unyielding support for the die body within the encasement, definitely positioned, is established.

An object of the instant invention, in order to attain this purpose, is to afford an encasement for the die body so constituted as to initially encompass a refractory member completely with the material of which the casing is composed and to establish substantially non-yielding universal support for said member, thus to obviate unequal strain thereon.

Another object of the invention is to afford a method of surrounding a die body with an encasement in such a manner as to assure intimate contact of the material, of which the encasement is composed, with the refractory member completely about its entire exterior, and thus rigidly support the body uniformly within the encasement against relative movement in all directions.

Other objects and advantages of the invention appear in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawing, in which:

Fig. 1 is an elevational view in central section of an encasement for a die body as initially formed;

Fig. 2 is a top plan view projected from Fig. 1, partly cut away;

Fig. 3 is an elevational view in central section of the encasement in its initial form, and with a refractory member and enveloping material therefor disposed therein, as arranged preliminary to fixation operations;

Fig. 4 is a top plan view projected from Fig. 3, partly cut away;

Fig. 5 is an elevational view, partly in section showing the refractory member therein and the encasement re-formed and including fragments of apparatus by which the die structure is reduced to an intermediate stage; and

Fig. 6 is an elevational view, partly in section showing the die structure completed.

The illustrative embodiment of the invention consists of an encasement for a wire drawing die body of a highly refractory type, such as a diamond and in which the body is firmly established in such manner that expansion of the die body in any direction is rigorously counteracted by the investment and surrounding encasement thereby to circumvent bursting or cracking of the die body.

In making the die structure, there is initially formed a block made of an extremely hard metal or alloy, such for example, as the product commonly known as "Monel" metal, shaped to have a cylindrical base 1 with a concentric upstanding neck 2, the diameter of which is substantially smaller than that of the base, there being made in the block an axial bore 3, open through the top of the neck and terminating at its bottom at a point spaced from the lower end of the base. Preferably, there is formed in the wall of the bore an annular recess 4 located at a point spaced above the bottom of the bore. There is then deposited and packed in the bore a quantity of pulverulent material of the same metallic character as that of which the block is composed to form a bed 5, upon which is seated a highly refractory member 6, such as a diamond that, when subsequently pierced, as hereinafter related, and lapped, constitutes a die body 6'. After the refractory member has been placed upon the bed 5 and accurately centered thereon, axially with respect to the bore, downward pressure is applied upon the member to assure the desired situs. A cover 7 consisting of an additional amount of

like pulverulent metal is introduced into the bore until the bore is filled therewith to a point spaced from the top of the neck. If desired, a circular plate 8 is then placed in the top of the bore to closely confine the pulverulent metal therein, thus to preserve the situs of the assembled parts.

The compact, consisting of the block in its initial form, the refractory member, the deposited pulverulent material, and the plate disposed therein, bodily is heated, and then superheated until the compact is susceptible to reshapement when confined and compressed.

To carry out the compacting operation there is provided a stationary anvil 9 around the upper end of which is disposed a vertically movable ring 10 adapted to encompass the base of the block when the block is seated upon the anvil. A ram 11 is arranged in axial alinement with the anvil and ring and is provided with suitable mechanism (not shown) for applying movement to the ram so as to enter the ring and forcefully compress the block and the assemblage of parts into a cylindrical form 12. During the operation of compressing the block and its pulverulent content about the die member, while hot, the wall of the bore in the solid metallic base 1 at points above and below the horizontal medial plane of the die member is forced radially inward at right angles to the axis thereof thus forming corresponding annular ledges 4' and 4'' that respectively underlie and overlie the rim of the die member. And during the compressing operation the pulverulent material constituting the bed 5 and cover 7 and the neck 2 (and the plate 8 if used) while superheated are reshaped and are firmly invested into and upon cooling become a solid integral part of the cylindrical form 12.

The retaining ring 10 is moved axially upon the anvil by means of any suitable appliance (not shown), so that when the ring is lowered the compressed block may readily be removed from the anvil, after which the form is pierced and lapped to provide a die opening 13 in the usual manner to complete the drawing die.

Variations from the particular construction above disclosed may readily be made by exercise of engineering skill without departure from the spirit or scope of the invention, and the following claims are intended to be inclusive of such variations.

What I claim is:

1. A wire drawing die constituted of a chambered block composed of solid metal having therein disposed a refractory member encompassed by an encasement of initially pulverulent metal similar in character to that of which the solid metal block is composed, the inner wall of said block being reshaped to form annular ledges that respectively underlie and overlie the rim of said member and adjacent portions of said encasement that confine said member and the encasement in a definite position in said block.

2. A wire drawing die constituted of a block of solid metal having an axial bore, an encasement formed of initially pulverulent material of high heat resisting properties disposed within said bore, and a refractory member imbedded in said encasement, the inner wall of said block being reshaped to form inwardly extending ledges wherefore to confine said member and encasement in a definite position within said block.

3. A wire drawing die constituted of a block the outer portion of which is composed of a solid hard ductile metal and the inner axial portion of which is composed of a melted and compressed initially pulverulent metal, integral with said outer portion, and a refractory member imbedded in and supported by said axial portion, said outer portion being interiorly reshaped to form inwardly extending ledges that respectively underlie and overlie the rim of said member and constrict such axial portion.

OTIS G. FERRIER.