

Aug. 31, 1926.

1,597,928

A. SIMONS

METHOD OF MAKING DIAMOND DIES

Filed Dec. 4, 1924

Fig:1.

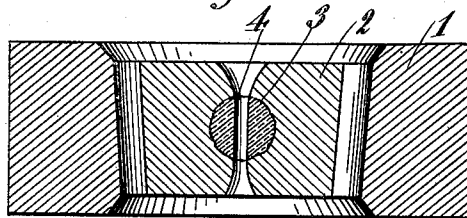


Fig:6.

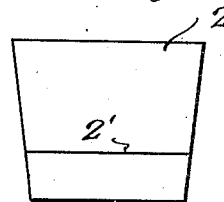


Fig:2.

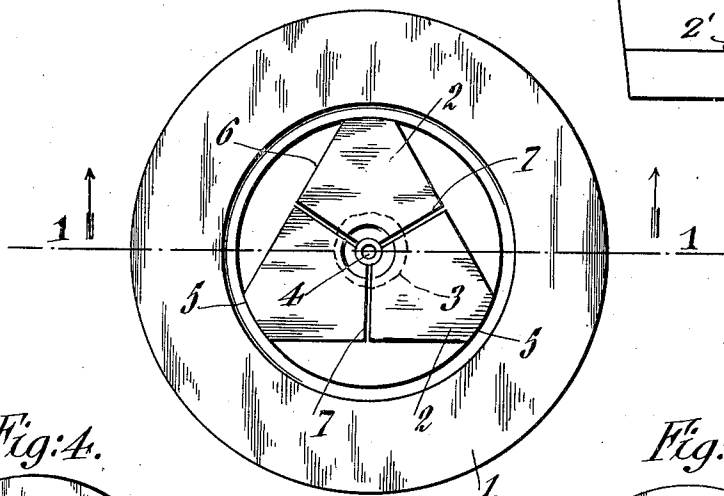


Fig:4.

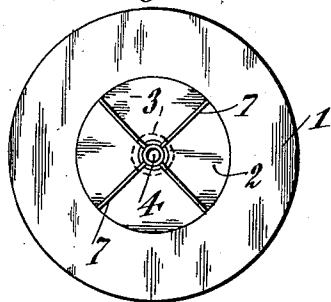


Fig:3.

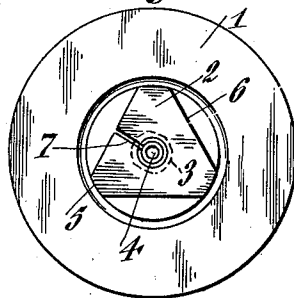
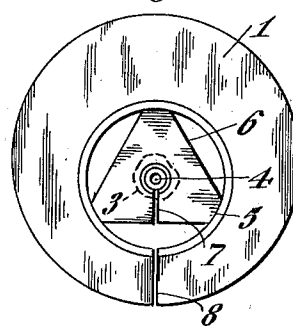


Fig:5.



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UNITED STATES PATENT OFFICE.

ABRAHAM SIMONS, OF NEW YORK, N. Y.

METHOD OF MAKING DIAMOND DIES.

Application filed December 4, 1924. Serial No. 753,928.

My invention relates to a new and improved form of diamond die and a new and improved method of manufacturing the same.

One of the objects of my invention is to provide a new and improved diamond die and a new and improved method of making a die of this character, whereby breakage of the diamond will be minimized and practically eliminated.

Another object of my invention is to provide a new and improved diamond die which shall be especially applicable for the utilization of large diamonds.

Another object of my invention is to provide a new and improved form of diamond die in which the diamond is held in a metal body and the metal body is permitted a certain freedom of lateral expansion when the diamond is in use.

Another object of my invention is to provide a new and improved form of diamond die in which the diamond is free to expand together with the metal holding means, when the diamond becomes heated relatively to the said metal holding means by reason of the wire passing through it.

Another object of my invention is to provide a new and improved form of diamond die in which the diamond is held in a metal holding ring by means of an intermediate series of completely or partly separated metal members.

Other objects of my invention will be set forth in the following description and drawings which describe a preferred embodiment of my invention.

Fig. 1 is a vertical central section.

Fig. 2 is an end view.

Fig. 3 is an end view showing a different embodiment of my invention.

Fig. 4 is an end view showing another embodiment of my invention.

Fig. 5 is an end view showing another embodiment of my invention.

Fig. 6, diagrammatically illustrates the manufacture of the nib illustrated in Fig. 2.

My invention is particularly applicable to the class of diamond die described in my previously issued Patents, No. 1,400,224, and No. 1,420,223.

My experience has shown that when a diamond of a relatively large size is used in a die of this character and the diamond is heated by the passage of the wire through it, that this sometimes results in the cracking

of the diamond after the structure has cooled off and is again used. The reasons for this are believed to be as follows although I do not wish to limit myself to any particular theory for the improved results secured by the structure herein illustrated:—

A diamond is a poor conductor of heat and when the diamond is heated because of the passage of the wire through it, it tends to expand so as to also expand the metal holding means immediately surrounding the same which are illustrated in my said former patents. If these metal holding means are not free to expand to a certain limited extent in a direction lateral to the axis of the die, then the pressure caused by the expansion of the diamond causes a creeping of the said metal holding means in a longitudinal direction. Hence, when the die is not used and the parts thereof are permitted to cool off, the diamond tends to shrink away from the surrounding metal means. It expands so slowly when the die is again put into service that the cold diamond is not reinforced by the surrounding metal walls and hence it cracks and this has been a source of substantial expense in the use of these dies.

According to my invention the metal means surrounding the diamond are permitted a certain lateral freedom of movement so that the bored diamond is subjected to a continuous internal pressure whether the diamond is hot or cold and under all conditions of use thereof.

As shown in Fig. 1 the die consists of an outer ring 1 having a tapered internal bore, a nib or interior holder 2 and a diamond 3 having the bore 4. This die is preferably made as described in my said two former patents so that the nib 2 which has an outer conical surface corresponding to the inner conical bore of the ring 1 is forced under pressure into the ring 1 whereby an internal pressure is produced in the nib 2. The diamond 3 is imbedded in the nib 2 so that the material of the nib 2 is compressed against the entire outer surface of the diamond. Hence the internal pressure produced upon the nib 2 as before mentioned, is imparted to every portion of the outer surface of the diamond 3 so that an inner pressure is produced upon the bore 4 of the diamond 3. This pressure is not great enough to crack the diamond as a diamond can withstand a considerable pressure if it is gradually ap-

plied. Hence as before explained in my previous Patents No. 1,400,224 and No. 1,420,223, the outward disruptive force produced when the wire is pulled through the die, is counterbalanced by the internal pressure produced upon the diamond.

As shown in Fig. 2, the outer surface of nib 2 is composed of three arcuate portions 5 having a contour similar to the bore of the ring 1 and these three arcuate portions 5 which are relatively short, are connected by three cut-out and planar portions 6. These planar portions 6 have narrow slots or cuts 7 formed therein which preferably extend up to the outer walls of the diamond 3 so that the nib 2 is really formed of three entirely different portions. This can be accomplished by originally forming the nib 2 of a greater length than is required for the die, forming the slots 7 in that portion of the nib which is intended to be utilized in the die, forcing the nib into position in the manner before described and shown in my said previously issued patents and then cutting away the surplus portion of the nib which has been allowed to remain solid. The cuts 7 are formed in the nib after the diamond has been firmly imbedded therein according to the method described in my previously issued patents. Thus, as shown in Fig. 6, the cuts 7 may be formed in the nib up to the line 2', leaving the portion thereof below the line 2' solid, and the surplus solid portion of the nib 2 below the line 2' can be cut away as before mentioned.

If desired, the cuts 7 need not extend completely to the outer wall of the diamond although I prefer to do this and a very thin continuous annular portion of the nib 2 may be allowed to remain surrounding the diamond 3. I prefer to make the cuts 7 as thin as possible and preferably by means of a very thin blade so that the width of said cuts is preferably between .005 of an inch to .010 of an inch. Hence every portion of the diamond is subject to the internal pressure before mentioned except the three very tiny portions thereof corresponding to the three cuts 7 and these cuts 7 are made so narrow that they do not affect the pressure on the diamond.

However, when the diamond expands because of the utilization of the die, the three portions of the nib 2 are free to move outwardly or laterally so that the ring 1 is caused to expand laterally to a very slight degree. The ring 1 has the bore thereof separated from the nib 2 adjacent the three substantial cut out portions 6 so that the interior bore of the ring 1 is able to flatten slightly at the three free arcs thereof and hence the entire structure acts like a lateral spring which subjects the diamond to a continuous inner pressure and is free to yield slightly when the diamond expands while

subjecting it to a continuous inner pressure.

The embodiment illustrated in Fig. 3 clearly shows that the nib 2 may have only a single slot or cut 7 and the number of slots may be varied without departing from my invention.

In the embodiment shown in Fig. 4, the nib 2 is provided with a plurality of slots 7 but the said nib does not have any cut out portions. In this particular structure, the ring 1 has its internal bore provided with arcs corresponding to the slots 7 and in addition the parts of the nib extending intermediate the slots 7 are free to yield laterally to a slight extent when they are subjected to pressure. By the "free" arcs of ring 1, I mean the arcuate portions thereof which are free from contact with the nib. In the embodiment shown in Fig. 5, the bore of the ring 1 is eccentric with respect to the outside surface thereof. The ring is provided with a slot 8 at the shortest radial line thereof and the nib 2 is provided with a single parallel slot 7. The said nib otherwise has the contour illustrated in Fig. 2. In this embodiment when the diamond expands, the nib and the ring are free to expand laterally because of the slots 7 and 8 so that a continuous lateral pressure is exerted upon the diamond under all conditions of use thereof and at all times. The nib 2 illustrated in Fig. 5 could also be made without the cut out portions as illustrated for example, in Fig. 4.

The ring 1 and the nib 2 may be made of any suitable metal as Monel metal, a low carbon steel and the like.

By way of illustration, I give the following dimensions. If the external diameter of the diamonds is approximately .25 inches then I prefer that the nib should have a mean external diameter of .50 inches and the ring should have an external diameter of one inch.

I do not wish to be limited to my dimensions but it is important that the ring and nib should be made of sufficient size to produce the proper lateral expansion with respect to the size of the diamond.

If desired, the outer ring 1 could be replaced by a series of rings tightly fitting one within the other so as to allow for a certain additional freedom of lateral expansion due to the fact that these rings would not fit perfectly one within the other.

It is obvious that especially in the embodiment shown in Fig. 5 when the nib 2 is forced into position under considerable pressure that this results in the lateral expansion of the holding ring so that a springy effect is originally secured and this springy effect is permanent and becomes greater as the diamond is expanded.

I have shown a preferred embodiment of

my invention, but it is clear that numerous changes and omissions could be made without departing from its spirit and I do not wish to be limited to the details before mentioned. 10

I claim:—

In the art of making a diamond die, those steps which consist in imbedding a diamond

in a nib, slotting the said nib at the portion thereof adjacent to the said diamond, forcing the said slotted portion into a metal holding ring and then removing the unslotted portions of the nib.

In testimony whereof I hereunto affix my signature.

ABRAHAM SIMONS.