R. KRAUSE.

APPARATUS FOR SETTING DIAMONDS, &c., FOR INDUSTRIAL USES.

APPLICATION FILED JAN. 23, 1903. RENEWED DEC. 13, 1909.

964,792. Patented July 19, 1910.

Fig. 1.

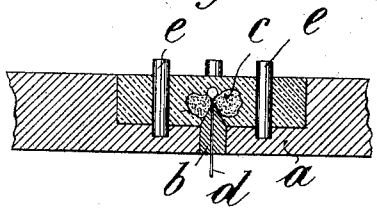


Fig. 3.

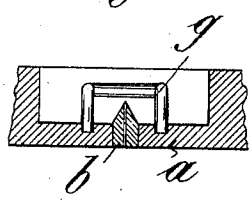


Fig. 5.

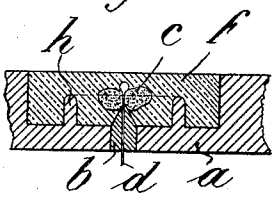


Fig. 2.

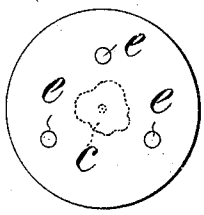


Fig. 4.

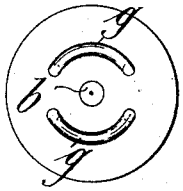


Fig. 6.

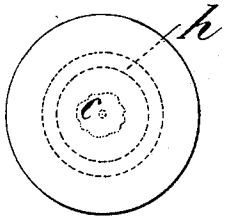


Fig. 7.

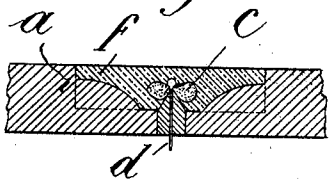


Fig. 9.

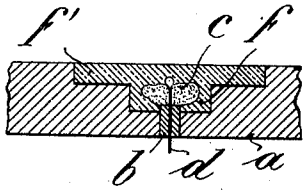


Fig. 8.

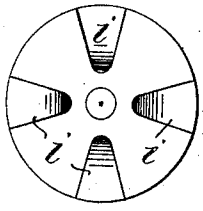


Fig. 11.

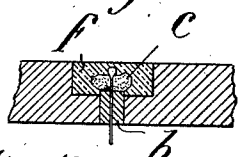


Fig. 12.

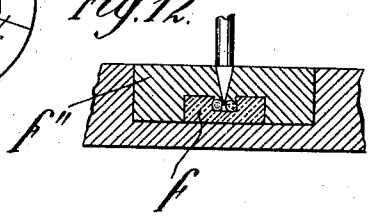
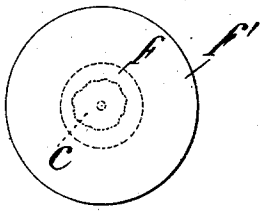


Fig. 10.



Witnesses:
H. E. Manning
Harold Lewis

Inventor:
Richard Krause
By Knight Bros
Attorneys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RICHARD KRAUSE, OF BERLIN, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ABRAHAM L. A. HIMMELWRIGHT AND GUSTAVUS C. HENNING, OF NEW YORK, N. Y.

APPARATUS FOR SETTING DIAMONDS, &c., FOR INDUSTRIAL USES.

964,792. Specification of Letters Patent. **Patented July 19, 1910.**

Application filed January 23, 1903, Serial No. 140,318. Renewed December 13, 1909. Serial No. 532,910.

To all whom it may concern:

Be it known that I, RICHARD KRAUSE, manufacturer, a subject of the German Emperor, and resident of No. 82 Steglitzerstrasse, in the city of Berlin, Kingdom of Prussia, and German Empire, have invented certain new and useful Improvements in Apparatus for Setting Diamonds, &c., for Industrial Uses, of which the following is a specification.

The setting of drawing-dies or stones—namely drilled diamonds, such as are used for wire drawing, is to be effected in a way protecting them from breakage as far as possible and for this reason the setting is to be carried out in such a way and to consist of such a material as will counteract all the causes tending to break the stone. It is evident that as an embedding or setting material cast steel deserves the preference above all others, not only on account of its comparatively great strength and hardness but also because it greatly contracts after the casting and thus holds the stone firmly in position. In spite of this excellent quality of cast steel as a setting or embedding material for wire-drawing stones, it has hitherto not been used for this purpose, as with the high melting temperature of the steel the diamond to be set is in a high degree affected by the same, that is to say, its surface is burned. Especially the carefully polished hole drilled through the stone is, in consequence of the high temperature of the liquid steel, made quite rough and unserviceable.

In order to be able to use steel as a setting material for wire-drawing stones, arrangements have to be made whereby the drawbacks resulting to the stone from the high melting temperature are removed. This is attained by the present invention by the expedient of drawing away heat as rapidly as possible from the liquid steel surrounding the stone, so that the steel, before it can exert any injurious effect on the stone, will be rapidly cooled down from white heat to red heat. This new idea can be carried out in many different ways.

In the accompanying drawing, forming part of this specification, Figure 1 is a vertical section, and Fig. 2 is a plan view of a mold and parts; Figs. 3 and 4 are similar views of another form of such apparatus; Figs. 5 and 6 are like views of another form of apparatus; Figs. 7 and 8 are like views of yet another form; Figs. 9 and 10 are similar views of still another form of apparatus; Fig. 11 is a section of a mold suitable for very small stones; and Fig. 12 illustrates the setting of a steel stone-holder in a softer metal.

It is more advantageous to use an open metal mold *a*, the bottom of which is provided with a support *b* for the stone. The support *b* may be in the form of a perforated cone, as shown in Figs. 1 to 8 inclusive; or it may be in the form of a perforated bolt or cylindrical stud b^x, as in Figs. 9 and 11. The perforated stone is held in place on the support *b* by means of a wire *d*, which is provided with a head, or is otherwise arranged to hold the stone down, and which wire passes through the perforation in the support *b* to the outside of the mold, which also is perforated, where its end may be secured in any suitable manner. The support *b*, and the head or end of the wire *d*, by preference, are coated with an insulating compound in order to prevent them from fusing with the steel or iron, but such coating may be omitted without departing from this invention and the scope and spirit of the claims herein.

In order to attain a rapid cooling of the liquid steel in the vicinity of the stone one can, as shown in Fig. 1, place metal pegs *e* into the mold which naturally draw away heat from the liquid steel by absorbing the same and giving it off partly to the air and partly to the mold itself. These pegs can later on be removed from the setting *f* or they may be left in it, because without insulation they become fused or welded together with the steel. One can however, as shown in Figs. 3 and 4, use, instead of the metal pegs, metal bows *g* or similar pieces of metal which will effectively answer the same purpose.

As shown in Figs. 5 and 6, the mold *a* itself may be provided, in the vicinity of the stone *c* with a ring *h* which will also effect a cooling of the steel in the vicinity of the stone. Of course in that case the setting *f* will be provided with holes or an annular groove, which are however, in no wise, detrimental to the strength of the steel.

As shown in Figs. 7 and 8, the mold *a* may be provided with ribs running up close to the stone either radially or any other way

and being of optional shape and cross section, so that the setting *f* will later on show on its lower surface channels or recesses corresponding to the ribs *i*. The latter will, of course, also effect a rapid cooling of the steel in the neighborhood of the stone.

The object aimed at can also be attained by giving the setting *f* as small a diameter as possible and providing it with a flange *f'* for the sake of an easier handling, as shown in Figs. 9 and 10. In consequence of the wall of the mold extending quite close to the stone *c*, the steel around the stone is, of course, rapidly cooled down and a burning of the latter on its surface prevented. If the stone to be set is not very large, the flange *f'* of Figs. 9 and 10 may be dispensed with and the small setting *f* may, as illustrated in Figs. 11 and 12, be placed into a larger mold and be circumfused with softer metal *f''*, such as bronze, so that the setting will be of the required size. The stone will also, in this way, in spite of its small size, be embedded in strong material without having suffered by the melting temperature of the steel. This expedient is especially of importance in those cases where the stone to be set weighs only about 0.05 grams and has a hole of, say, 0.08 mm. or less. For such stones a steel block of about 6–8 grams will be sufficient.

In Figs. 1–8 a cone is given as a support for the stone. It is however not strictly necessary that the support should be a cone, but a hollow bolt $b^{\times}$ flattened at its top end may be used, as shown in Fig. 9 especially with small flat stones which will rest on the support with a larger surface and are, consequently, better cooled.

In many cases the stone may be placed at the bottom of the mold, that is to say, the support *b* may be entirely dispensed with, but in that case it will frequently happen that the steel is chilled off too much on the cold bottom of the mold and does not embrace well the stone so that the stone is not perfectly embedded or mantled. It is therefore to be recommended to make, as a rule, use of a support *b*.

Stones properly embedded in steel after this method, are on the shrinking of the steel, compressed with an enormous power and more uniformly than can be attained by other means, so that, in fact, the diamond on being used for wire-drawing is not subject to accidental but only to the natural wear and tear. It is understood, of course, that, before the diamond can be used for wire-drawing, the metal is cut away or removed to the perforation in the stone, and that the wire is drilled out; this is done after the metal has set or become cold and the casting removed with its stone from the mold or form *a*. A bursting or cracking of the diamond, such as frequently happens with the settings now used, is practically excluded with stones set after this process.

The invention may be otherwise embodied than as herein shown and above described.

What I claim as my invention and desire to secure by Letters Patent of the United States is—

1. Means for setting stones for industrial uses consisting of a mold and means, independent of the stone-holding devices and projecting inwardly from the bottom of the mold, for drawing heat from the molten metal at points closely adjacent to the stone and transmitting such heat to the body of the mold.

2. Means for setting stones for industrial uses consisting of an open mold and means, independent of the stone-holding devices and projecting inwardly of the mold from the bottom thereof, for drawing heat from the molten metal at points closely adjacent to the stone and transmitting such heat to said mold.

3. Means for setting stones for wire-drawing dies, consisting of a perforated mold or form, and a wire passing through the perforation in the mold and adapted to pass through a perforated stone and hold the same in place while the molten metal is poured in and sets.

4. Means for setting stones for wire-drawing dies, consisting of an open mold having a perforation through its bottom, and a wire passing through said perforation and adapted to pass through a perforated stone and hold the same in place while the molten metal is poured in and sets.

5. Means for setting perforated stones in metal, consisting of an open mold having a perforated stone-support rising from the bottom thereof, and a wire passing through said perforated stone-support and adapted to pass through a perforated stone and hold the same in place while the molten metal is poured in and sets.

The foregoing specification signed at Berlin this 20th day of December, 1902.

RICHARD KRAUSE.

In presence of—

WOLDEMAR HAUPT,

HENRY HASPER.