Aug. 6, 1935. T. B. SITZLER 2,010,569

METHOD OF PLUGGING HOLES IN PLATES

Filed March 28, 1934

FIG. I.

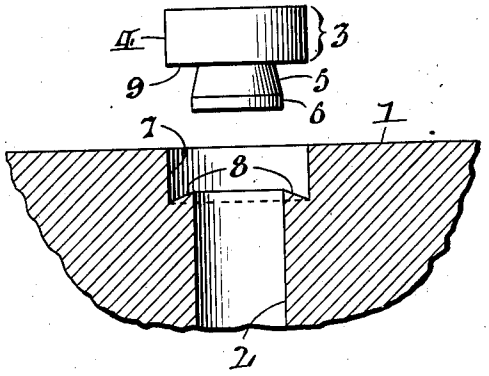


FIG. II.

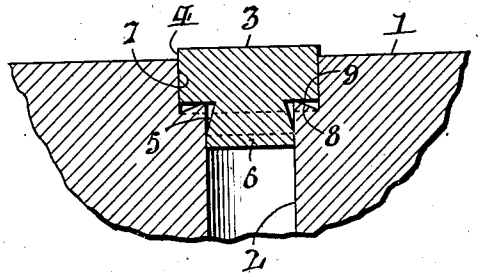


FIG. III.

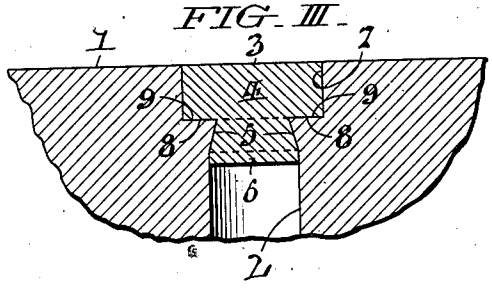


FIG. IV.

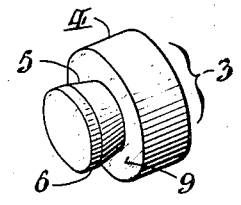


FIG. V.

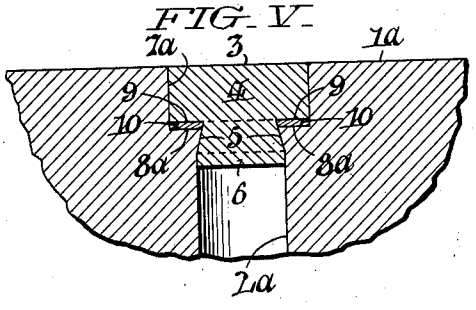


FIG. VII.

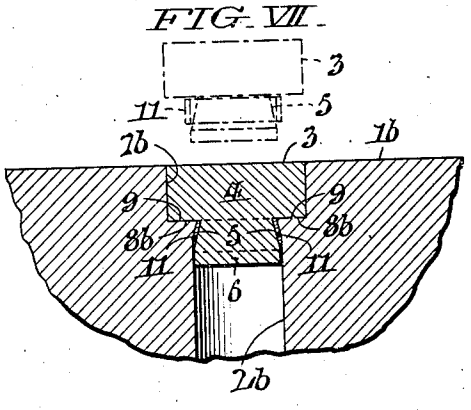


FIG. VI.

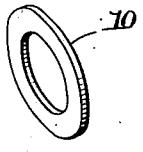
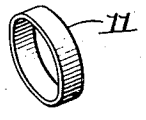


FIG. VIII.



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METHOD OF PLUGGING HOLES IN PLATES

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Application March 28, 1934, Serial No. 717,869

5 Claims. (Cl. 29—148)

My invention relates generally to a method of plugging holes in plates, and has particular utility as applied to plugging the ends of passages in steam platens.

Heretofore various methods have been proposed for drilling and plugging holes in metal plates. For example, in lieu of the customary screw threaded plugs employed for closing the ends of the interior passages of steam platens, it has been proposed to employ plugs of special shape which are driven with a forced fit to effect a tight seal between the end of the passage and the plug. Such methods have not proved altogether satisfactory, either because the operations involved are too elaborate and expensive, or because the plug does not effectively seal the passage against the internal fluid pressure.

Accordingly, the object of the present invention is to provide a method of plugging holes in metal plates which involves only simple and inexpensive operations, and which results in effectively sealing the holes. More particularly, the method of this invention is characterized by the formation of a novel interlocking joint between the plug and the mouth of the passage to be plugged, which joint is capable of withstanding high internal pressure without danger of failure. It will be understood that the invention is adapted for many other uses than the plugging of holes in steam platens, and that it possesses other more specific objects and advantages which will become apparent from the description hereinafter set forth of several examples of the practice thereof, having reference to the accompanying drawing. Of the drawing:

Fig. I represents a side elevation of a plug ready for insertion in a steam platen, a portion of the platen surrounding the hole to be plugged being shown in cross section.

Fig. II represents the platen and plug in cross section, with the plug inserted in the hole and ready to be driven home.

Fig. III is a similar view showing the same parts with the plug driven home.

Fig. IV is a perspective view of the plug.

Fig. V is a view similar to Fig. III, but illustrating a modified method in which a soft metal disc is interposed between the plug and the shoulder at the hole in the steam platen.

Fig. VI is a perspective view of the soft metal disc.

Fig. VII is a view similar to Fig. III, but showing a modification of the above method in which a soft metal ferrule is interposed between the plug and the wall of the hole in the steam platen, the figure also showing in dot-and-dash lines how the ferrule is applied to the plug before the plug is driven; and,

Fig. VIII is a perspective view of the soft metal ferrule.

In Figs. I, II and III of the drawing, a portion of a steam platen is represented at 1, with a hole or passage to be stopped shown at 2, and with the special form of plug shown at 3. The plug 3 has a cylindrical body portion 4 and a centrally depending projection 5 concentric with the body portion. The projection 5 gradually increases in diameter from its upper end towards its lower end, and preferably terminates in a cylindrical base 6 of a diameter such that it will fit snugly within the hole 2 of the steam platen 1. Thus the projection 5 assumes a substantially conical shape with its tapered wall sloping upwardly and inwardly toward the body portion.

In carrying out the practice of my invention, the steam platen 1 is formed with an enlarged hole or counterbore 7, concentric with the steam passage 2 at the mouth thereof, and extending to a depth substantially equal to the thickness of the body of the plug 3. When the steam platen 1 is thus counterbored at the passage 2, there is incidentally formed a sharply pointed shoulder 8 at the base of the counterbore, the top surface of the shoulder being inclined upwardly and inwardly.

In Fig. I the parts are shown in readiness for assembly. In Fig. II the plug 3 is shown seated in its initial position within the steam passage 2. It will be noted that the body portion 4 fits snugly within the counterbore 7, and that the depending conical projection 5 fits snugly within the passage 2, with the cylindrically formed base 6 of the projection serving to center the plug. Moreover, it will be observed that the cavity or void defined at the base of the counterbore between the flat undersurface 9 of the body portion 4 of the plug 3 and the sloping surface of the sharply pointed shoulder 8 is substantially equal in volume to the cavity or void defined between the vertical wall of the passage 2 and the tapered wall of the conical plug projection 5.

After the parts have been thus assembled, the plug 3 is driven home within the steam platen 1. The driving of the plug 3 against the sharply pointed shoulder 8 forces the metal of the shoulder into intimate locking engagement with the conical plug projection 5, so that when the top surface of the plug is flush with the edge of the steam platen 1, the shoulder 8 is distorted to the

shape represented in Fig. III. When thus driven home, the plug 3 is not only secured against dislodgment, but also the mouth of the steam passage 2 is effectively sealed. By properly designing the sharply pointed shoulder 8 at the base of the counterbore, the shoulder 8, incident to the driving of the plug 3, may be caused to assume a shape substantially complementary to that of the plug, as represented in Fig. III.

While good results may be obtained with the method described above, there is represented in Figs. V and VI, an alternative method which furnishes a very effective fluid tight seal at the plug. According to this method the counterbore 7*a* in the steam platen 1*a* is made to a greater depth than the previously described counterbore 7, and a soft metal ring 10 is interposed between the shoulder 8*a* of the steam platen 1*a* and the flat surface 9 of the plug 3. Accordingly, when the plug 3 is driven home, the metal of the ring 10, as well as the metal of the shoulder 8*a*, is forced into intimate engagement with the conical projection 5 of the plug. The soft metal ring 10 assures the formation of a fluid tight seal in the vicinity of the shoulder 8*a*.

A further example of the practice of my invention is represented in Figs. VII and VIII. According to the method there illustrated, a soft metal ferrule 11 is inserted around the conical projection 5 of the plug 3 before the plug is applied to the steam platen 1*b*. Either the ferrule 11 may be made to fit closely over the conical projection 5, as illustrated by the representation of the plug and ferrule in broken lines, or obviously the ferrule 11 may be split and sprung over the conical projection 5 of the plug 3. When the plug 3 is driven home, the shoulder 8*b* at the base of the counterbore 7*b* is distorted with the metal thereof displaced, which in turn compresses the soft metal ferrule 11 and forces the same into intimate engagement with the conical projection 5 of the plug 3. This method likewise insures the formation of a fluid tight seal in the vicinity of the shoulder 8*b*.

According to the several methods outlined above, it will be noted that in each example the parts are so designed that with the insertion of the plug, an annular void is defined at each side of the shoulder at the base of the counterbore, the two voids being of triangular cross section and substantially equal in volume. Accordingly, when the plug is forced home, the metal of the shoulder is free to assume the new shape desired for it.

While I have described several examples of the practice of my invention, showing certain specific shapes for the plug and the mouth of the passage in the plate, it will be apparent that various changes may be made in the shape of the parts without departing from the spirit of my invention, and it will also be apparent that the method herein described has utility in many other fields than for the plugging of holes in steam platens.

Having thus described my invention, I claim:

1. A method of plugging a hole in a plate of the character described which consists in counterboring the plate at the hole with incidental formation of a sharply pointed shoulder at the base of the counterbore, inserting in said hole and counterbore a plug having a body portion substantially fitting the counterbore and having a depending conical projection with its enlarged bottom end fitting said hole, and driving the body of the plug against said sharply pointed shoulder thereby forcing the point of said shoulder into locking engagement with the conical projection aforesaid.

2. A method of plugging a hole in a metal plate of the character described which consists in forming a counterbore in the plate concentric with the hole therein, with incidental formation of a shoulder with an acute angled point at the base of the counterbore, inserting in said hole and counterbore a plug having a flat-bottomed disc-shaped body of a diameter fitting the counterbore, and having a concentric projection of conical formation depending therefrom with its enlarged bottom end fitting said hole, and driving the body of the plug against said acute angled shoulder, thereby forcing the shoulder into locking engagement with the conical projection aforesaid.

3. A method of plugging a hole in a metal plate of the character described which consists in counterboring the plate at the hole with incidental formation of a shoulder at the base of the counterbore, providing a plug having a body portion substantially fitting the counterbore and having a depending projection of gradually increasing diameter towards its lower end and terminating in a cylindrical base of a diameter substantially equal to that of the hole, inserting the plug within said hole and counterbore with the cylindrical base of its depending projection, guiding the body of the plug into seating engagement with said shoulder, and driving the body of the plug against said shoulder to displace the same and force it into locking engagement with the projection aforesaid.

4. A method of plugging a hole in a metal plate of the character described which consists in counterboring the plate at the hole with incidental formation of a shoulder at the base of the counterbore, applying to said hole and counterbore a plug having a body portion substantially fitting the counterbore and having a depending conical projection with an enlarged end fitting said hole, with interposition of a soft metal ferrule between said projection and the wall of said hole, and driving the body of the plug against said shoulder to displace the metal thereof, thereby compressing the ferrule and forcing the same into engagement with the conical projection.

5. A method of plugging a hole in a metal plate of the character described which consists in counterboring the plate at the hole with incidental formation of a sharply pointed shoulder at the base of the counterbore, inserting in said hole and counterbore a plug having a body portion fitting the counterbore and having a centrally depending conical projection with its enlarged bottom end fitting said hole, said shoulder and plug being so designed that when the plug is thus seated in its initial position an annular cavity is defined at each side of said sharply pointed shoulder, and said cavities are of substantially equal volume, and driving the body of the plug against said shoulder, thereby forcing the point of said shoulder into locking engagement with the conical projection aforesaid.

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