

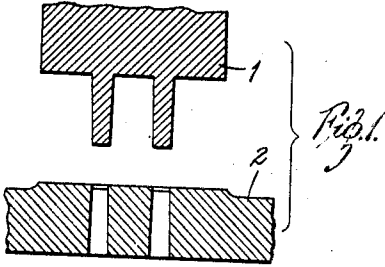
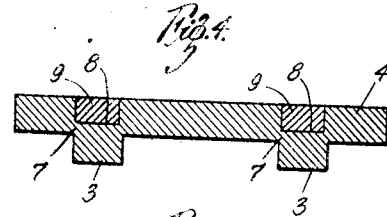
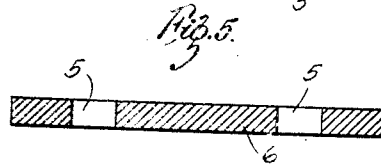
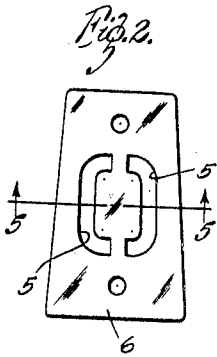
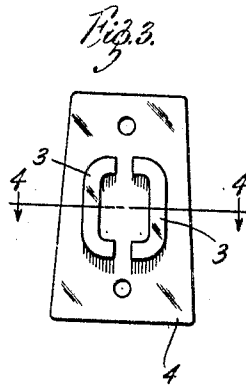
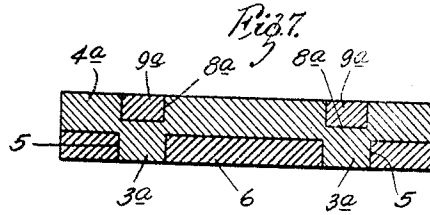
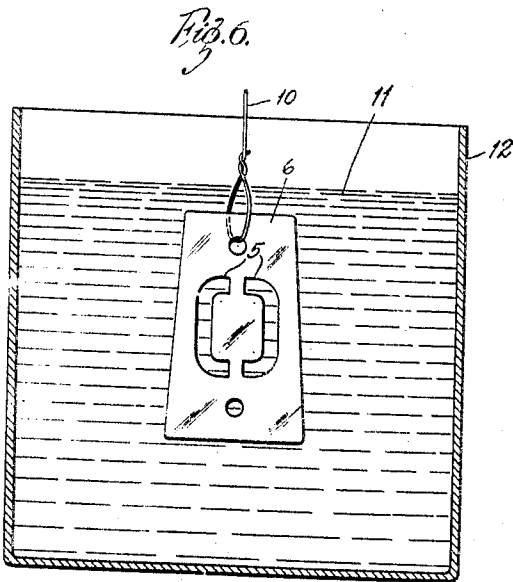
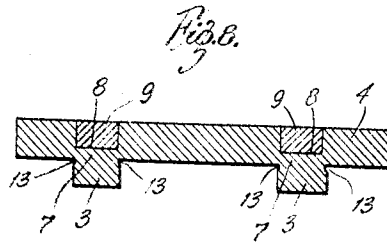
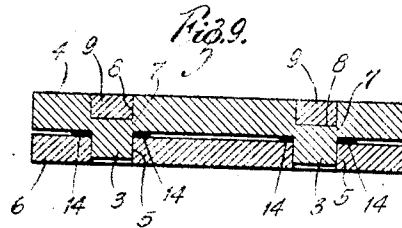
April 27, 1943.

O. J. HERB

2,317,527

PROCESS OF MAKING STENCIL CHARACTER PUNCH AND DIE SETS

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PROCESS OF MAKING STENCIL CHARACTER
PUNCH AND DIE SETSOtto J. Herb, St. Louis, Mo., assignor to Diagraph-
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10 Claims. (Cl. 76-107)

This invention relates to the manufacture of mating character punch and die sets for stencil cutting machines. The principal object of the present invention is to simplify and cheapen the process of making such stencil character punch and die sets. The invention consists in the process hereinafter set forth and claimed.

In the accompanying drawing, which forms part of the specification and wherein like symbols refer to like parts wherever they occur:

Fig. 1 is a vertical sectional view of a master punch and die set used in practicing my process,

Fig. 2 is a face view of a die plate made with the master punch and die set shown in Fig. 1,

Fig. 3 is a similar view of a punch plate made with the same master punch and die set,

Fig. 4 is a cross-section through the punch plate on the line 4-4 in Fig. 3, the recess formed in the top of said plate by the punched-out character forming ribs on the bottom thereof being shown filled with solder,

Fig. 5 is a similar cross-section through the die plate on the line 5-5 in Fig. 2,

Fig. 6 is a vertical sectional view of a tank containing a corrosive fluid for enlarging the character forming openings of the die plate,

Fig. 7 is a cross-sectional view through the die plate and a master punch plate after the character forming openings in said die plate have been enlarged to snugly receive the character ribs of said master punch plate,

Fig. 8 is a cross-sectional view of the punch plate, with the sides of the character forming ribs thereof, undercut adjacent to the body thereof; and

Fig. 9 is a cross-sectional view, showing the punch and die plates after the punch plate ribs are forced into the distorted die plate openings and the non-conforming sides of said ribs are sheared or shaved off by the distorted edges of said openings.

In carrying out my present process, a master punch and die set including a punch 1 and a die 2 is used to punch character forming ribs 3 in a punch plate 4, and corresponding character forming openings 5 in a die plate 6. The character forming openings 5 extend clear through the die plate 6; and the character forming ribs 3 are formed on the punch plate 4 by pressing said ribs part-way therethrough, leaving integral connections 7 between said ribs and punch plate and recesses 8 on the back of the latter, which recesses are preferably filled with solder 9 so as to support and strengthen said ribs.

The die plate 6 is then subjected to the action

of a chemical agent, such as nitric acid, which corrodes or eats away the metal and thus uniformly enlarges the character forming openings 5 in said plate to snugly receive the ribs 3a of a master punch plate 4a which is made with the master punch 1 and die 2 and is also provided with a solder filling 9a in the recesses 2a back of said ribs. The die plate 6 is suspended by an acid resisting wire 10 in a suitable nitric acid solution 11 contained in an acid resisting container 12; and, after the openings 5 in said die plate are sufficiently enlarged to snugly receive the ribs 3a of the master punch plate 4a, said die plate is removed from said solution and rinsed in water to stop further corrosion and to protect the hands of the operator. The die plate 6 is then hardened by suitable heat treatment, after which the punch plate opposing face of the said hardened die plate is ground to provide sharp cutting edges along the character forming openings 5 therein.

As a result of the heat treatment of the die plate 6, the character forming openings 5 therein are distorted slightly so that the fit obtained between ribs 3a of the master punch plate 4a and the die plate openings 5 by the acid sizing of said openings is lost. However, the mating punch plate 4 for the hardened die plate 6 is left soft and a close fit of the character forming ribs 3 of the relatively soft punch plate in the slightly distorted character forming openings 5 of the die plate is obtained by forcing said ribs into said openings, whereby the sharp edges of the openings of the hardened die shave off the non-conforming sides of the ribs of the relatively soft punch plate. As shown in the drawing, the sides of the character forming ribs 3 of the punch plate 4 are undercut, as at 13, adjacent to the body thereof, whereby the shavings 14 removed from the sides of said ribs by the punch plate are automatically detached therefrom when the cutting edges of the die plate openings reach the undercut portions of said ribs.

The hereinbefore described process has several important advantages. The character forming holes 5 in the die plate 6 are quickly and easily enlarged to fit the ribs 3a of the master punch plate 4a by the action of the nitric acid solution or other suitable corrosive agent, thereby eliminating the slow, difficult and expensive hand filing operation heretofore employed to enlarge said openings; and a close fit of the character forming ribs of the punch plate of each punch and die plate set in the slightly distorted character forming openings of the hardened die plate of said set is readily obtained without hand filing

or shaping merely by forcing said ribs into said openings, the hardened die plate acting as a skinning or dressing die. By undercutting the sides of the punch plate ribs, the shavings are detached therefrom without the use of a separate hand tool.

If desired, the openings in the die plate 6 may be sized to fit the ribs on the unhardened punch plate 4 with which said punch plate is to be used, thereby dispensing with the use of the master punch plate 4a. However, the use of the master punch plate is preferable, because the size and shape of the punch shape vary due to difference in texture and hardness of the metal and also because it makes it unnecessary to pair the punch and die plates until the final sizing of the ribs of the hardened die plate.

What I claim is:

1. The process of making mating stencil character punches and dies which consist in punching character forming openings in a die plate and corresponding character forming ribs on a punch plate with the same master punch and die, subjecting said die plate to the action of a corrosive agent to enlarge the character forming openings therein, hardening said die plate, and then forcing the character forming ribs of said punch plate into the character forming openings in said hardened die plate to conform said ribs to said openings.
2. The process set forth in claim 1, wherein the sides of the punch plate ribs are undercut at the base prior to the conforming operation to facilitate removal of shavings produced by said conforming operation.
3. The process of making mating stencil character punches and dies which consist in punching character forming openings in a die plate and corresponding character forming ribs on a punch plate with the same master punch and die, subjecting said die plate to the action of a corrosive agent to enlarge the character forming openings therein, hardening said die plate by heat treatment, and then pressing said punch plate and die plate together to cause said die plate to shave the punch plate ribs to a close fit in the die plate openings.
4. The process set forth in claim 3, wherein the sides of the punch plate ribs are undercut along the base prior to the shaving operation to facilitate removal of the shavings produced thereby.
5. The process of making a stencil character punch and die set which consists in forming character forming openings in a die plate and corresponding character forming ribs on a punch

plate, subjecting said die plate to the action of a corrosive agent to enlarge the character forming openings therein, and then forcing the character forming ribs of said punch plate into the character forming openings in said die plate to conform said ribs to said openings.

6. The process of making mating stencil character punches and dies which consist in punching character forming openings in a die plate and corresponding character forming ribs on a punch plate with the same master punch and die, forming a master punch plate with ribs thereon corresponding to the character forming ribs of said first mentioned punch plate, subjecting said die plate to the action of a corrosive agent to enlarge the character forming openings therein to closely fit the ribs of said master punch plate, hardening said die plate and then forcing the character forming ribs of said first mentioned punch plate into the character forming openings in said hardened die plate to conform said ribs to said openings.

7. The process set forth in claim 6, wherein the sides of the ribs of said first mentioned punch plate are undercut at the base prior to the conforming operation to facilitate removal of shavings produced by said conforming operation.

8. The process of making mating stencil character punches and dies which consist in punching character forming openings in die plates and corresponding character forming ribs on punch plates with the same master punch and die, adapting one of said punch plates for service as a master punch plate, subjecting said die plates to the action of a corrosive agent to enlarge the character forming openings therein to snugly receive the ribs of said master punch plate, hardening said die plates, and then forcing the character forming ribs of a punch plate into the character forming openings in a hardened die plate to conform the ribs of said punch plate to the openings in said die plate.

9. The process set forth in claim 8, wherein the sides of the punch plate ribs are undercut at the base prior to the conforming operation to facilitate removal of the shavings produced by said conforming operation.

10. The process set forth in claim 8, wherein the master punch plate is produced by the conforming operation, the sides of the punch plates are undercut prior to said conforming operation and the corrosive agent comprising a nitric acid solution in which said die plates are immersed.

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