Sept. 17, 1929. O. S. KOSKINEN 1,728,796

METHOD OF AND MECHANISM FOR MAKING BLANKING DIES AND THE LIKE

Filed Oct. 14, 1926

Fig. 1.

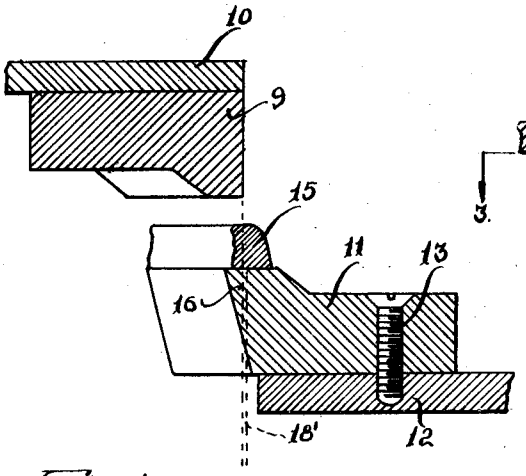


Fig. 2.

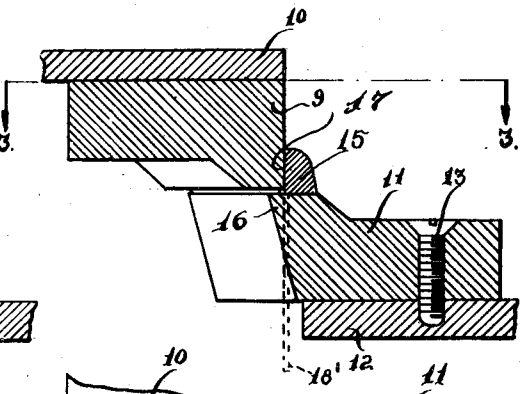
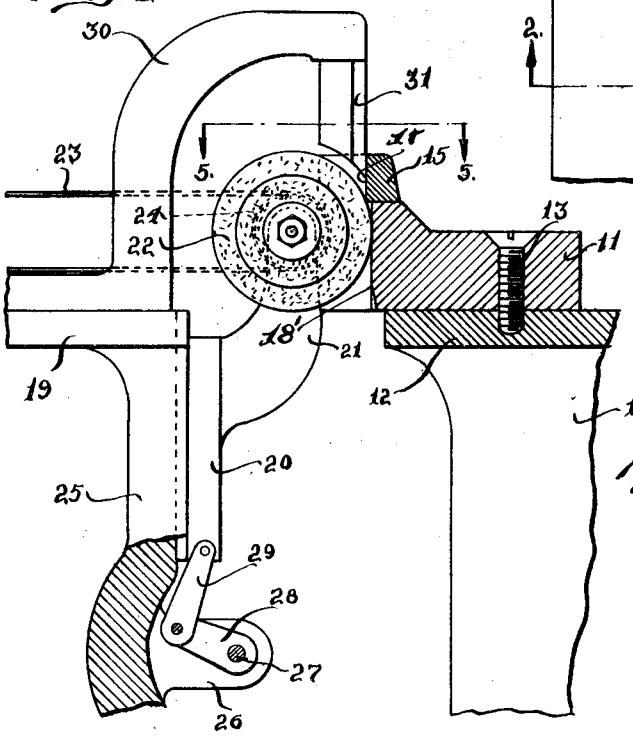


Fig. 4.



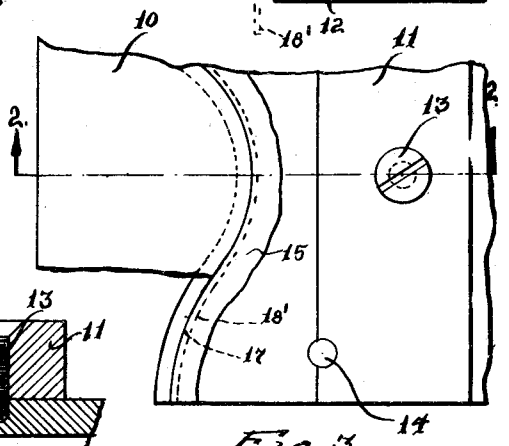
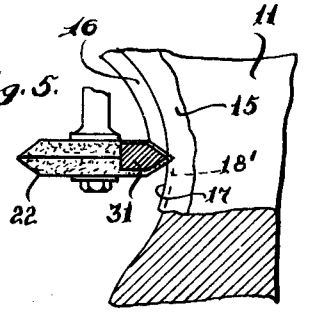


Fig. 3.

Fig. 5.



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UNITED STATES PATENT OFFICE

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METHOD OF AND MECHANISM FOR MAKING BLANKING DIES AND THE LIKE

Application filed October 14, 1926. Serial No. 141,490.

My invention relates to a new and useful improvement in a method of, and mechanism for, making blanking dies and the like. In the manufacture of blanking dies it is necessary that in order to produce a clean cut blanking from a piece of sheet metal, it is necessary that the blanking die have the correct amount of clearance between the punch and the die steels. This clearance, of course, varies with the thickness of the stock to be blanked. Uniformly corrected clearance between a punch and die of irregular outlines is difficult to provide and maintain due to the distortion of the sections during heat treatment.

The present invention has, as its object, the provision of a die in which the distortion resulting from hardening or other causes may be eliminated by subsequent grinding. In carrying out the operation a small amount of surplus material is left on one of the parts, preferably the die, and this material subsequently ground away so as to fit the die to the punch after the hardening of both of the parts. In order to effect this a mass of comparatively soft material, such as metal or the like, of the approximate contour of the punch steels, is securely attached to the die steels overlapping the surplus material which is to be ground from the die steel. While mounted in suitable holders the soft material is sheared by the punch through applying pressure to the punch holder forcing the punch through the sheared material, thus establishing a surface projecting inwardly of the outer edge of the die from which a grinding operation may be located to reduce the die to the proper dimensions and accurately determined as to its contour. To provide a mechanism for effecting such an operation, and to establish this method of determining or locating a surface, is an object of the present invention.

To establish the clearance between the die and the punch it is necessary that the die be ground back sufficiently. Consequently, the die should be ground inwardly of the locating surface as mentioned, and it is another object of the invention to provide a method of grinding dies and other co-operating parts whereby a locating surface is established and the grinding of the die effected from the locating surface as a guide, the grinding of the die being carried inwardly of the die a slight distance beyond the locating surface.

Other objects will appear hereinafter.

The invention consists in the combination and arrangement of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings which form a part of this specification, and in which,

Fig. 1 is a vertical sectional view through a punch and die in spaced relation, showing the die provided with the shearable material.

Fig. 2 is a view similar to Fig. 1 in which the punch has been moved relatively to the die so as to effect a shearing to the shearable material.

Fig. 3 is a fragmentary top plan view of a punch and die with the shearable material mounted on the die.

Fig. 4 is a fragmentary vertical sectional view of a grinding machine adapted for use in carrying out the invention.

Fig. 5 is a fragmentary sectional view taken on substantially line 5—5 of Fig. 4.

In the drawings I have shown the punch steel 9 mounted upon its respective casting 10 in any desired manner, and the die steel 11 I have shown mounted upon its casting 12 by a screw 13 and a suitable dowel 14. Mounted upon the upper surface of the die 11, adjacent its outer or operative edge so as to overlap the line determined by the periphery of the punch 9 when in operative relation to the die 11, is a mass 15 of comparatively soft material, such as light metal or the like, the particular kind of material being left to the selection of the manufacturer so long as the material is sufficiently soft to permit an easy shearing by the punch 9.

As shown in Fig. 1, the die steel 11 has a projecting portion 16 which extends outwardly from the line 17 determined by the periphery of the punch 9. Were this die steel 11 to be ground back to the line 17, a snug, tight fit of the punch 9 in the die, would be effected, and it will be noted that the mass 15 extends beyond he line 17 so that when the punch 9 is moved into the position shown in

Fig. 2 the mass 15 is sheared so as to form thereon a surface in which the line 17 lies, this surface corresponding to the contour or periphery of the punch 9. By mounting the mass 15 on the die 11 and moving the punch 9 into shearing position, as shown in Fig. 2, it is evident that the surface established on the mass 15 by the periphery of the punch 9 corresponds exactly to the size and contour of the punch so that a surface has been established from which the grinding portion on the die 11 may be carried on to grind the die back to the line 17.

However, in order to provide the necessary clearance between the punch 9 and the die 11 it will be necessary to grind the die 11 inwardly from the surface thus established on the mass 15 and in the drawings I have illustrated the clearance as determined by the surface in which lies the line 18. In Fig. 3 I have illustrated a punch and die of irregular contour to illustrate the manner in which this irregular contour may be accurately established relatively to the die 11. In Fig. 4 I have shown a grinding machine of simple structure whereby the surface thus established may be utilized for guiding the grinding operation. In this machine I have provided a suitable bed 18 upon which may be fixedly mounted the casting 12 and the die 11 after the shearing of the mass 15 and the establishing of the guide surface, as mentioned. A bed or table 19 is provided upon which is vertically slidably mounted an arm 20 carrying a bracket 21 upon the end of which is rotatably mounted a grinding wheel 22, this grinding wheel being driven by a belt 23 connecting with a suitable source of power, the belt 23 passing over a suitable drive wheel 24. Projecting outwardly from the guide 25 of the table at the lower end thereof, is a suitable support 26 in which is journalled a shaft 27 connected to a suitable source of power for rotating the same. Fixedly mounted upon the shaft 27 is a link 28 connected at its free end to the link 29 which is pivotally connected to the arm 20 so that a rotation of the shaft 27 will effect a vertical reciprocation of the grinding wheel 22. Projecting upwardly from the bed 19 is a curved arm 13 carrying the downwardly projecting guide portion 31. This guide portion 31 terminates at its outer surface slightly within the periphery of the grinding wheel 22, as shown in Fig. 5, so that when the outer surface of the guide portion 31 engages the sheared or locating surface of the mass 15, the periphery of the wheel 22 will project inwardly of the die 11 so that the die may be ground to the line 18', while the surface of the mass 15 in which lies the line 17 may be used as a guide surface for limiting the grounding inwardly of the die. It is of course evident that the distance by which the periphery of the grinding wheel 22 projects beyond the engaging face of the guide portion 31 will be determined by the amount of clearance desired between the punch and the die, and that the wheel 22, will have to, in its operation, be maintained in proper relation, as to its periphery, to the engaging surface of the guide portion 31.

It is believed evident that the shape of the engaging surface of this guide portion 31 may be as desired. In this way the grinding of a die to the exact contour of the punch 9 which co-operates, leaving a clearance between the punch and the die, becomes possible so that there is exact correspondence between the contour of the operative surface of the die and the periphery of the punch. The bed 18 is so mounted as to be movable relatively to the grinding wheel 22 in any desired manner so that a relative aproach and withdrawal of the material to be ground and the grinding wheel may be effected. In this grinding operation as shown in Fig. 4, the lower portion of the guide member 15 may be ground off in order to bring the die into proper contact with the grinding wheel.

The mass 15 is mounted on the die 11 after the die 11 has been hardened so that when the die is ground the size as described, there is no distortion or mutilation of the die because of its having been already hardened, the present method making it possible to accurately grind the co-operating parts after the hardening.

It is believed evident that the same method of locating and grinding illustrated on a blanking die may be used with equally effective results on other objects and particularly for locating a shaping or a milling operation where it is necessary to fit two co-operating surfaces closely together and particularly where these co-operating surfaces are of irregular outline.

In the drawings I have shown the mass 15 as sheared by the punch, but it is also believed evident that the same method of locating and grinding could be used by moving the punch into engagement with the die and while in such engagement pouring a plastic mass around the punch and allowing it to set and adhere to the die, the guide surface being thus obtained for the purposes intended, and it is my intention to bring within the scope of the present invention such a method.

While I have illustrated and described the preferred form of structure, I do not wish to limit myself to the precise form shown, but desire to avail myself of such variations and modifications as may come within the scope of the appended claims.

Having thus described my invention what I claim as new and wish to secure by Letters Patent is:

1. The method of locating on material a surface to be ground thereon consisting in mounting on said material a mass of material and forming on said mass a guide surface

corresponding in contour to the surface to be ground; and grinding the desired surface on said material from the guide surface as a guide.

2. The method of forming a die consisting in forming said die with an excess of material at its operative edge, hardening said die, mounting on said die overlapping its operative edge a mass of material forming on said mass a guide surface corresponding in contour to the surface desired and grinding said excess from said die, using said guide surface established as a guide in the grinding operation.

3. The method of forming a pair of cooperating telescoping parts having a slight clearance between the same when in telescoping relation, consisting in mounting on the surface of one of said parts a mass of comparatively soft material and impressing in said material by the other part the outline of said one part and grinding said one part inwardly from said outline so formed, using the outline on said mass of material as a guide surface.

4. The method of forming a die adapted for use with a cooperating die consisting in forming said die with an excess of material at its operative edge, mounting on said die a mass of comparatively soft material and forming on said material the outline of said die by the cooperating die and grinding the excess material, using the outline on said soft material as a guide.

5. The method of forming the operative edge of a die adapted for use with a cooperating die consisting in mounting on said die a mass of comparatively soft material, outlining, on said soft material by said cooperating die, the outline to be formed on said first mentioned die and grinding said first mentioned die inwardly from the outline so formed the amount of clearance space desired, using the outline surface formed on said material as a guide in the grinding operation.

In testimony whereof I have signed the foregoing.

ONNI S. KOSKINEN.