

915,659.

C. H. CLARK.
LOOSE PUNCH.
APPLICATION FILED MAR. 22, 1907.

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Fig. 1.

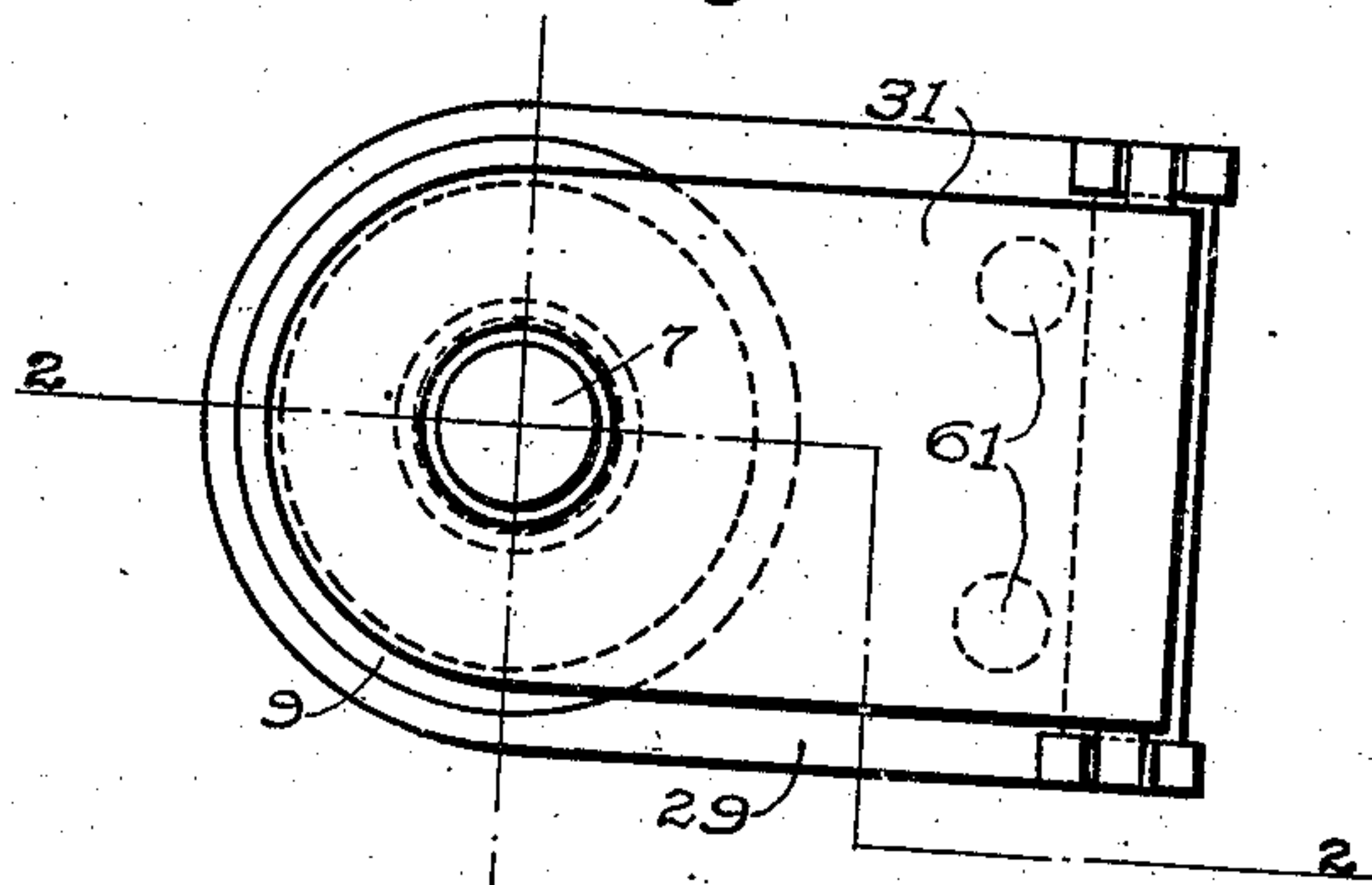
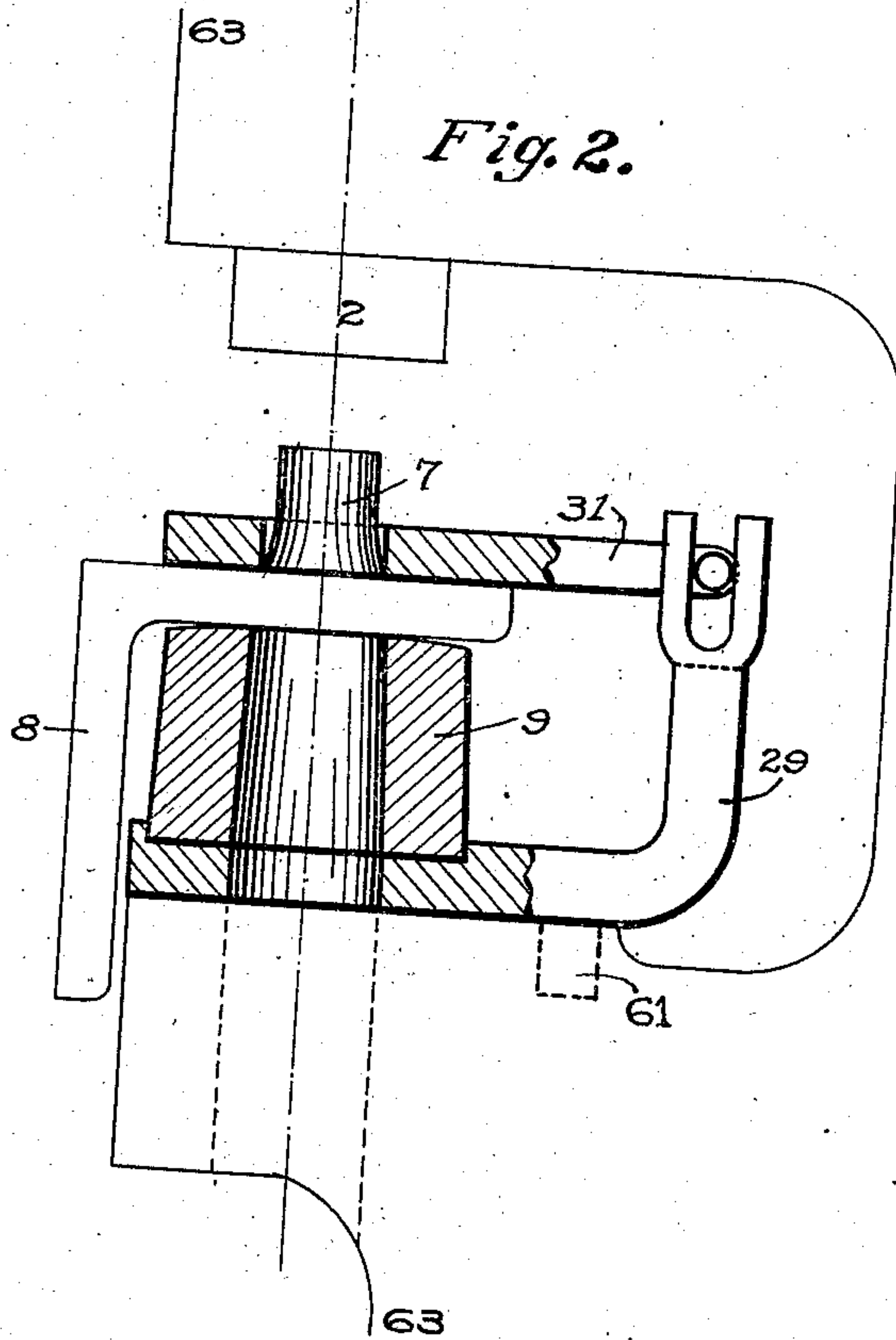


Fig. 2.



WITNESSES:

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LOOSE PUNCH.

No. 915,659.

Specification of Letters Patent.

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Application filed March 22, 1907. Serial No. 363,891.

To all whom it may concern:

Be it known that I, CHARLES HOMER CLARK, a citizen of the United States, residing in Crafton, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Loose Punches for Punching Holes in Metal Plates or other Structural Material; of which the following is a specification.

10 The object of the invention is the provision of a loose punch adapted to pass through and drop from the hole which it cuts, said punch being of such configuration as to maintain throughout its length the greatest possible cross sectional area in a punch of this character.

A further object of the invention is the provision of a loose punch of the character set forth and having plane upper and lower faces by virtue of which the punch will maintain itself in an upright position when placed upon the material to be punched. This arrangement of plane faces also renders it possible to use a plurality of punches adapted to be acted upon by a ram of such area as to overlie a plurality of punches. Since any portion of the surface of a flat ram is adapted to coact with the plane upper faces to the punches, it is apparent that the position of the punches may be varied at will to thereby vary the location of the holes to be punched in the material.

A further object of the invention is to eliminate the necessity of stripping the material from the punch and to provide punches of varying lengths adapted to be acted upon by a ram common to all of them, whereby the pressure required to force the punches through the metal is delivered through a greater duration of time, thus greatly reducing the work per unit of time, and making the total work of the ram more uniform.

Further objects and advantages of the invention will be set forth in the detailed description which now follows.

50 In the accompanying drawing, Figure 1 is a plan view of a punch and the parts connected therewith, and Fig. 2 is a view partly in section and partly in side elevation on line 2—2 of Fig. 1, together with an outline of a portion of a punching machine and a piece to be punched.

Reference is also made to my copending application for patent for "a machine for punching holes in metal plates, or other

structural material", filed Feb. 26, 1907, Serial No. 360,061, and in which these punching tools are shown.

Like numerals designate corresponding parts in both of the figures of the drawing.

Referring to the drawing, the numerals 63 designate the jaws of a punching machine, said punching machine being provided with the usual vertically movable ram 2, said ram having a plane lower face. A die templet 29 is removably mounted upon the lower jaw 63, and carries a die 9. The die templet is provided with upturned bifurcated jaws which are adapted to receive horizontally projecting pins of a punch templet 31. This punch templet has an opening formed therein which is adapted to receive the punch 7 which forms the subject matter of the present invention. It is apparent that upon the descent of the ram 2, with sufficient force, the punch 7 will be forced through the material 8, and after it is free of said material, will drop through the opening of die 9, said punch following the slug which has been punched from the material, through said die. Any convenient means for catching the punches below the machine, separating them from the slugs and returning them to a convenient point for re-use, may be employed.

The punch 7 has plane upper and lower faces. This punch will therefore maintain itself in an upright position upon the material to be punched, its location upon said material being determined by the location of the opening in the punch templet. Since the ram 2 is likewise provided with a plane lower face, it will be seen that the thrust upon the punch is a direct vertical thrust and that consequently there is no tendency for the punch to turn over. The provision of these plane upper and lower faces in a loose punch, or a punch which has no external support, is an important feature.

As is best illustrated in Fig. 2, the shank of the punch is longitudinally curved throughout a portion of its length and is straight throughout the remainder of its length. This structure is likewise a very important one, for the following reasons:—As soon as the punch begins to penetrate the metal, the material around the upper edge of the hole being punched, tends to flow inwardly thereby decreasing to a slight extent the diameter of the hole. If the punch were perfectly straight, it is apparent that this inflow of the metal

would bind upon the shank of the punch and prevent it from falling freely from the machine. Upon the other hand, where the shank of the punch is tapered from end to end, the punch is unduly weakened for it is only necessary to reduce the punch from the lower face to a point which lies about at the upper face of the material at the completion of the punching operation. From that point, the shank of the punch may be straight. This renders it possible to secure the greatest degree of strength in a punch of this character, and results in reducing the fiber strains in the punch. It is apparent that these features are of particular advantage in a loose punch, for it provides a punch the diameter of which is reduced to such an extent that it will drop freely through the hole which it cuts. Of course, in a fixed punch adapted to be withdrawn by the machine itself, this consideration does not enter into the case.

It is apparent that the die templet 29 may carry a number of dies of the same or of different sizes and shapes, and that the templet 31 may have holes for corresponding punches to thereby punch two or more holes at one operation of ram 2. Where a plurality of punches are used, I prefer to make them of varying lengths to reduce the pressure required to force the punches through the material.

The provision of the bifurcated extensions for engaging the pins of the punch templet 31 renders said punch templet freely adjustable with relation to the die templet. Pieces 8 of varying sizes may therefore be inserted between the punch templets and the dies while maintaining said punch templets in a horizontal plane. Since both the punch and die templets are removable, it is apparent that other and similar parts carrying the proper dies and punches may be substituted therefor when it is desired to punch holes of different sizes and shapes or location.

From the foregoing description, it will be seen that simple and efficient means are herein provided for accomplishing the objects of the invention, but while the elements shown and described are well adapted to serve the purposes for which they are intended, it is to be understood that the invention is not limited to the precise construction set forth, but includes within its purview, such changes as may be made within the scope of the appended claims.

Having described my invention, what I claim is:—

1. A loose punch adapted to pass entirely through the hole which it cuts and having a head and a base of greater area than the head, and a shank portion the surface of which lies inside of a straight line between the head and the base.

2. A loose punch adapted to pass entirely

through the hole which it cuts, said punch having a flat head and a flat base of greater area than the head, and a shank portion, the surface of which lies inside of a straight line between the head and the base.

3. The combination with a plurality of loose punches adapted to pass completely through the holes which they cut, of a ram of such area as to overlie a plurality of said punches simultaneously, said punches being of varying lengths.

4. The combination with a plurality of loose punches adapted to pass completely through the holes which they cut, of a ram of such area as to overlie a plurality of said punches simultaneously, said punches being of varying lengths, and the lower faces of said punches presenting a greater area than any cross section through said punches would present.

5. The combination with a plurality of loose punches adapted to pass completely through the holes which they cut, of a ram of such area as to overlie a plurality of said punches simultaneously, said punches being of varying lengths, the lower faces of said punches presenting a greater area than any cross section through said punches would present, and the shanks of said punches being longitudinally and inwardly curved.

6. The combination with a plurality of loose punches adapted to pass completely through the holes which they cut, of a ram of such area as to overlie a plurality of said punches simultaneously, said punches being of varying lengths, the lower faces of said punches presenting a greater area than any cross section through said punches would present, the shanks of said punches being longitudinally and inwardly curved, and said punches having plane upper and lower faces.

7. The loose punch for punching holes in metal and adapted to pass entirely through the hole which it cuts, said punch having plane upper and lower faces connected by a longitudinally curved shank.

8. A punch comprising a shank portion and upper and lower faces, the lower face presenting a greater area than the upper face and said shank being inwardly and longitudinally curved for a portion of its length, and straight for the remainder of its length.

9. A loose punch adapted to pass entirely through the hole which it cuts having plane upper and lower faces and a shank the surface of which lies inside of a straight line between the edges of the upper and lower faces.

10. The combination with a punch adapted to pass completely through the hole which it cuts, of a die templet, a punch templet adapted to maintain the loose punch in alignment, said punch templet being connected for vertical movement with relation to the die templet.

11. A plurality of loose punches adapted to pass completely through the holes which they cut, said punches being of varying lengths substantially as described.
- 5 12. A loose punch adapted to pass through the hole which it cuts in combination with a ram having an operating surface adapted to act upon said punch, any portion of said operating surface being adapted to engage
- 10 said punch for operating the same.
13. A loose punch for punching holes in

metal plates adapted to pass completely through the hole which it cuts, said punch having a plane upper face and a lower cutting edge, the area included by the cutting edge being greater than would be included in any cross section through the punch parallel to said cutting edge.

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Witnesses:

BERTHA PENCE,
O. H. MOSIER.