July 6, 1965 J. I. FOURNIER 3,192,640

UNIVERSAL PRECISION TRANSFER CENTER PUNCH

Filed May 3, 1963

FIG. 1.

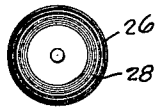


FIG. 2.

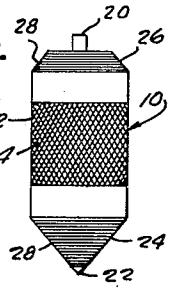


FIG. 3.

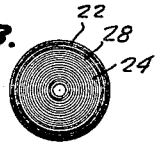


FIG. 4.

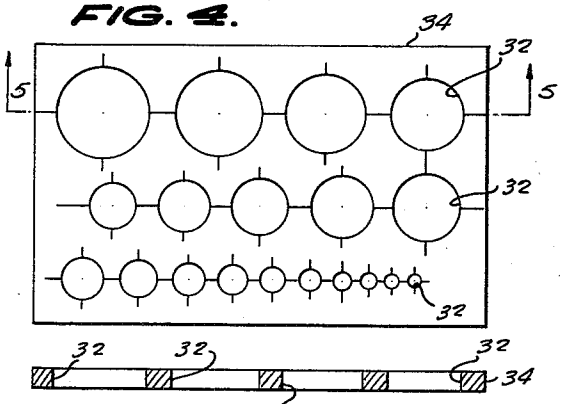


FIG. 5.

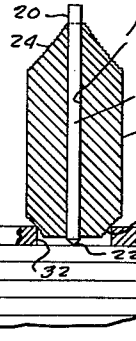


FIG. 6.

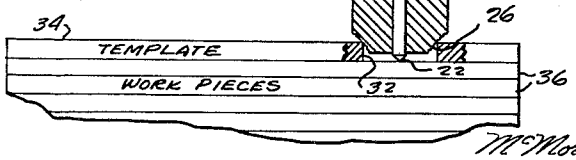


FIG. 7.

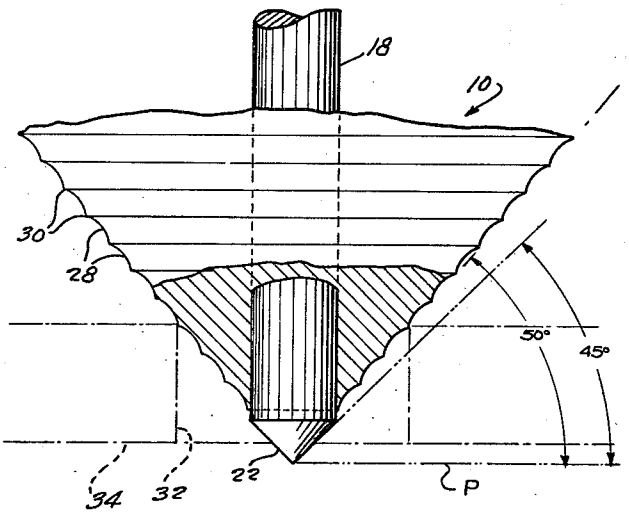
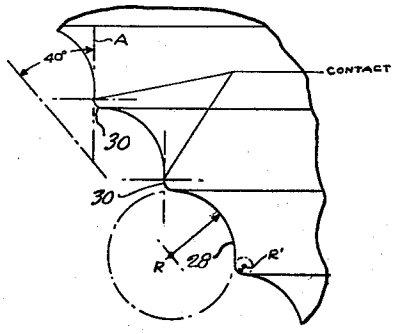


FIG. 8.



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UNIVERSAL PRECISION TRANSFER CENTER PUNCH

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This invention relates to the general field of hand tools and, more specifically, the instant invention pertains to a precision transfer center punch.

As is well-known in this art when the craftsman or mechanic is engaged in layout work wherein it is necessary to locate the center point of an opening to be bored or drilled in one or more workpieces, it is the usual practice to superimpose a template over the workpiece, the template having one or more openings extending transversely therethrough to serve as guides for conventional center punches. In general practice, one end of a center punch is inserted within the guide openings, and the other end thereof is struck in order that a mark may be made on the work to indicate the center of the opening to be formed in a workpiece.

The center punch must fit precisely within the opening formed in the template, otherwise the center mark formed in the workpiece will be eroneously placed.

In carrying out layout work wherein the template has one or more guide openings formed therein, each having a different diameter, a center punch for each guide must be provided, the center punches having diameters exactly corresponding to the diameters, respectively, of the template guide openings.

Transfer center punches are commercially available on the open market in the form of sets, and these sets include punches, usually, of one-sixteenth inch fractional diameter dimensions. To properly handle precision center point transfer for templates having openings formed therein varying in diameters between one-eighth inch to one inch requires that the craftsman have available over one hundred center punches, and this, at considerable cost to him. These sets are standard tools and do not take into consideration manufacturing requirements wherein templates are required that have guide openings formed therein having diameters falling between two of the standard sized center punches. Under these conditions, the smaller of the punches is normally used and the center mark is made through observance only. This is unsatisfactory, since a small human error could lead to the ruin of the workpiece. This is especially true in this age of decreasing tolerances.

In addition to the above disadvantages, the conventional center punches are not adaptable, as a general rule, for use with templates having circular openings formed therein according to the metric or other systems of measurement.

Still further, conventional center punches having tapering punch ends are, for the most part, useless when used with relatively thin templates, for the guide sleeves thereof cannot be properly received within the template openings.

Thus, one of the primary objects of this invention is to provide a center punch of simplified design which overcomes the defects of the prior art devices.

Another object of this invention is to provide a precision transfer center punch having substantially universal application within the limits of its size.

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A further object of this invention is to provide a center punch which automatically aligns with the template openings within the limits of the diameter of the punch.

Still another object of this invention is to provide a center punch of the type generally described supra, with a minimum of moving parts.

This invention contemplates, as a further object thereof, the provision of a center punch that is non-complex in construction and assembly, inexpensive to manufacture, and which is accurate and durable in use.

Other and further objects and advantages of the instant invention will become more evident from a consideration of the following specification when read in conjunction with the annexed drawing, in which:

FIGURE 1 is an end elevational view of a center punch constructed according to this invention;

FIGURE 2 is a side elevational view of the center punch;

FIGURE 3 is an end elevational view of the other end of the center punch;

FIGURE 4 is a top plan view of a template;

FIGURE 5 is a detail longitudinal, cross-sectional view of the template, FIGURE 5 being taken substantially on the horizontal plane of line 5—5 of FIGURE 4, looking in the direction of the arrows;

FIGURE 6 is a longitudinal medial, cross-sectional view of the center punch as shown in FIGURE 2, FIGURE 6 also showing the center punch in operative position;

FIGURE 7 is a fragmentary enlarged, side-elevational view partly broken away of one end of the center punch and showing its application to a template shown in dotted lines; and

FIGURE 8 is an enlarged fragmentary, side-elevational view showing the construction of the grooves and ribs at each end of the center punch.

Referring now more specifically to the drawing, reference numeral 10 designates, in general, a universal precision transfer center punch constructed in accordance with the teachings of this invention. The center punch 10 is seen to comprise an elongated substantially cylindrical main body portion 12 formed of a rigid material as, for example, steel, the main body portion 12 being knurled over a central section thereof, as at 14.

The main body portion 12 is provided with an axially-extending bore 16 in which is slidably received an elongated substantially solid, cylindrical punch rod 18 also formed of steel, and having opposed hardened ends 20, 22. The end 20 is flat to receive a blow from an impact tool (not shown), and the end 22 is ground at an angle of 45° relative to a horizontal plane P shown in dotted lines in FIGURE 7.

As is seen in FIGURES 2 and 6, the main body portion 12 terminates at one end 24 thereof in a primarily conic configuration while its other end 26 has a frustoconical configuration. Preferably, but not necessarily, the angle of the sides of the ends 24, 26 with respect to the given horizontal plane P is the same, and as is shown in FIGURE 7, a practical angularity has been found to be substantially 50°.

Each of the ends 24, 26 is formed with a plurality of concentric arcuate grooves 28 which increase in diameter as the grooves 28 approach the main body portion 12 (see FIGURE 7).

The arcuate grooves 28 are ground on any desired

radius R to provide equal spacing between each adjacent pair of ribs 30 each of which has a convex configuration, and each rib 30 is ground and polished on a radius R' to provide a template contact angle of substantially 40° (see FIGURE 8) with respect to the vertical axis A at the contact point thereof within the selected one of the template openings 32 of a template 34, illustrated in FIGURES 4 and 5.

The use of this center punch 10 is shown in FIGURE 6 wherein it is seen that a template 34 has been superimposed on one of a plurality of workpieces 36. The template 34 may have one or more openings 32 formed therein having the same or differing diameters.

One of the ends 24 or 26 is now inserted within a selected opening 32. In FIGURE 6 the end 26 is shown in cooperation with a relatively thin template 34, while the end 24 would be employed in conjunction with templates having a greater thickness. The craftsman now gently turns or rocks the tool 10 until it seats firmly within the opening 32, one of the ribs 30 engaging within the opening 32 along the line of contact (see FIGURE 8). The rod 18 has a longitudinal axial length greater than the longitudinal axial length of the main body portion 12 and including the ends 24, 26, so that the rod 18 projects beyond the ends 24, 26.

With the center punch 10 in position on the template 34, the craftsman now strikes the end 20 causing the pointed end 22 to engage and mark the workpiece 36 underlying the template 34.

It will be understood, of course, that when smaller openings 32 are used, the rod 18 is withdrawn from the main body portion 12, and is reversed and re-inserted so that the end 22 is now positioned adjacent the end 24, and this latter end is now employed with a selected template 34 in the same maner as described above. The conical end 24 has been intentionally devised in order to enable the center punch 10 to seat perpendicularly, especially on thin templates so that the extreme outer end or tip thereof will not rest on the immediately adjacent workpiece 36 when centering is being done from the smaller template openings or holes.

FIGURE 7 is of further interest in that it demonstrates that the center punch 10 is illustrated as having the apex of one of the ribs coincident with the upper edge of a selected template opening 32 and wherein the center punch 10 remains firmly seated.

In actual practice, the main body portion 12 is provided with a bore 16 having a diameter of 0.1255 of an inch. The punch rod 18 is formed to a diameter to provide a slip-fit in the bore 16. It was found that without hardening the ends 20, 22 the punch rod 18 had a tendency to slide out of the bore 16 upon repeated use of the tool 10. It was discovered that hardening the ends 20, 22 appears to impart a slight distortion in the punch rod 18 which gives rise to a friction fit between the rod 18 and bore 16 just sufficient to retain the punch rod 18 therein, even after considerable usage.

The conical end 22 is ground to its 45° angle prior to the hardening of the tip 22 so it will be true to the bore 16 after hardening.

Having described and illustrated one embodiment of this invention in detail, it will be understood that the same is offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A precision center punch comprising an elongated main body portion having a pair of opposed ends, said main body portion having a bore extending axially therethrough, one of said ends having a tapered configuration, said tapered end having a plurality of concentric arcuate grooves formed therein providing adjacent pairs of ribs, said ribs being rounded, and a punch rod slidably mounted in said bore and having an axial length longer than said main body portion.

2. A precision center punch comprising an elongated main body portion having a pair of opposed ends, said main body portion having a bore extending axially therethrough, one of said ends having a frusto-conical configuration, said frusto-conical end having a plurality of concentric grooves formed therein to provide adjacent pairs of ribs, said ribs being rounded, and a punch rod slidably mounted in said bore and having an axial length longer than the axial length of said main body portion.

3. A precision center punch comprising an elongated main body portion having a pair of opposed ends, said main body portion having a longitudinally-extending axial bore formed therein, one of said ends having a conical configuration and the other of the said ends having a frusto-conical configuration, each of said ends having a plurality of concentric arcuately-shaped grooves formed therein to provide adjacent pairs of ribs, said ribs being rounded, and a punch rod slidably mounted in said bore and having an axial length longer than the axial length of said main body portion.

4. A precision center punch as defined in claim 3, wherein said punch rod is pointed at one of its respective ends with the side of said pointed end being disposed at substantially 45° with respect to its longitudinal axis, and the sides of said conical and frusto-conical ends are disposed at an angle of substantially 40° with respect to the longitudinal axis of said main body portion.

5. A precision center punch as defined in claim 4, wherein said ribs are rounded to provide aligned contact with a template guide opening at a template contact angle disposed at substantially 40° with respect to the longitudinal axis of said main body portion.

6. A precision center punch comprising an elongated main body portion having a pair of opposed ends, said main body portion having a longitudinally-extending axial bore formed therein, one of said ends having a substantially conical configuration and the other of said ends having a substantially frusto-conical configuration, each of said ends having a plurality of concentric arcuately-shaped grooves formed therein to provide adjacent pairs of ribs, a punch slidably mounted in said bore and having an axial length longer than the axial length of said main body portion, and said punch rod having a pair of opposed hardened ends, and an axially-distorted portion intermediate said ends frictionally engageable within said bore to releasably and frictionally hold said rod within said bore.

7. A precision center punch having an elongated substantially cylindrical main body portion provided with a pair of opposed ends, said main body portion having a bore extending axially therethrough, one of said ends having a tapered configuration, said tapered end having a plurality of concentric grooves formed thereon each adjacent pair of grooves being separated by a rib with each rib having a convex arcuate configuration, each successive groove disposed inwardly from the outer end of said tapered end toward said main body portion being struck on a greater radius, and a punch rod slidably mounted in said bore and having an axial length greater than the axial length of said main body portion.

8. A precision center punch comprising an elongated substantially cylindrical main body portion having a pair of opposed ends, said main body portion having a longitudinally-extending axial bore formed therein, one of said ends having a conical configuration and the other of said ends having a frusto-conical configuration, each of said ends having a plurality of arcuately-shaped grooves formed therein to provide adjacent pairs of ribs, each successive groove on each of said ends being struck on a greater radius, and a punch rod slidably mounted in said bore and having an axial length greater than the length of said main body portion.

9. A precision center punch comprising an elongated substantially cylindrical main body portion having a pair of opposed ends, said main body portion having a longi-

tudinally-extending axial bore formed therein, one of said ends having a substantially conical configuration and the other of said ends having a substantially frusto-conical configuration, each of said ends having a plurality of arcuately-shaped grooves formed therein to provide adjacent pairs of ribs, each successive groove disposed inwardly from the outer ends of said conical end and said frusto-conical end and disposed inwardly therefrom toward said main body portion being struck on a greater radius, a punch rod slidably mounted in said bore and having an axial length longer than the axial length of said main body portion, and said punch rod having a pair of opposed ends and an axially-distorted portion intermediate said ends frictionally engageable within said bore to releasably and frictionally hold said rod within said bore.

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