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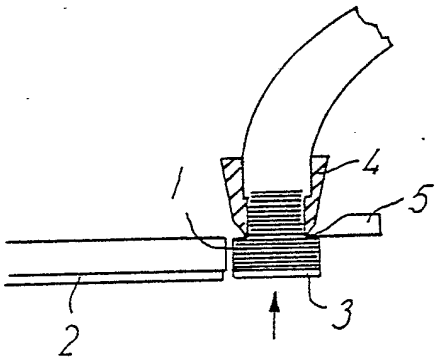
(54) Title: A PUNCHING APPARATUS, PARTICULARLY FOR PUNCHING LABELS AND SIMILAR PRINTED MATTER ITEMS




(57) Abstract

A punching apparatus for punching items having curved or arched edges from sheet material, particularly labels and similar printed matter items, comprises a punching die in the form of a mainly tubular member (6) manufactured from a sintered carbide alloy and having an internal cavity in which at least the wall surfaces (8) at the cutting edge are ground to smoothness, preferably to a surface roughness Ra $< 0.1$ µm, and are perpendicular to the plane of the cutting edge, whereas grinding of the cutting edge (7) into a prescribed sharpness and cutting angle is performed solely on the external side of the tubular member (6). As a result thereof the intervals between necessary re-grindings of the cutting edge (7) are pro-

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A punching apparatus, particularly for punching labels and similar printed matter items.

The invention relates to a punching apparatus for punching items having curved or arched edges from sheet material, particularly labels and similar printed matter items, in a large number of pieces by a single working operation, comprising means for supporting a stack of a large number of sheet sections each containing one of said items and a punching die arranged above said supporting means, said supporting means and said punching die being movable relative to one another, said punching die having the form of a mainly tubular member one end of which is shaped to form a plane circumferential cutting edge corresponding to the form of said items.

In the production of labels for use on bottles and the like a large number of identical label prints are made side by side on a sheet material, such as a paper or plastic laminate, and the printed sheet is cut along straight cutting lines in generally rectangular sections, each containing a label print having a well-defined position within the respective section.

After piling of a number of such sheet sections into a pile or stack, punching of the labels to their final form is performed by means of a punching die, a whole stack being supplied on to a movable pressure plate positioned below the punching die , by the subsequent activation of which the punching die cuts through the sheet sections in the stack such that by the movement of the pressure plate the punched label items are pressed through the internal cavity of the punching die.

In prior art punching dies for this purpose, it has been customary to attempt to reduce friction when the punched label items are pressed through the punching die iron, by shaping the internal cavity with slightly oblique walls such that the cross sectional area of the cavity increases in the direction away from the cutting edge of the punching die.

Since it is necessary in the prior art punching dies, which are usually made of tool steel, to regrind the cutting edge at relatively short intervals, the said shape will result in a gradual increase of the cross sectional area in the plane of the cutting edge such that already after relatively few re-grindings the punched label items no longer keep the desired measurements, on the accuracy of which relatively high demands are made in view of the subsequent use in a labelling machine. This results in a short operational life for the punching die, which will thus often have to be scrapped after a relatively moderate number of re-grindings.

For use particularly but not exclusively in the punching of labels and similar printed matter items, it is the object of the invention to provide a punching apparatus wherein the above-mentioned disadvantages are remedied.

In order to accomplish this, a punching apparatus according to the invention is characterized in that said tubular member is manufactured from a sintered carbide alloy with an internal cavity in which at least the wall surfaces at the cutting edge are ground to smoothness and are perpendicular to the plane of the cutting edge, whereas grinding of the cutting edge to a prescribed sharpness and cutting angle is performed solely on the external side of the tubular member.

With this design of the punching apparatus an almost unlimited number of re-grindings can in practice be effected with full retention of the accuracy of measurement of the cutting edge, and furthermore as a result of the die being made from a sintered carbide alloy an appreciable prolongation is obtained of the intervals between re-grinding relative to the prior art punching dies.

In a preferred embodiment of the invention said carbide alloy is a tungsten-cobalt alloy, which is ground on said wall surfaces to a surface roughness of $Ra \leq 0.1$ µm.

The invention is based upon the recognition of the fact that in the manufacture of the punching die it is possible to grind the wall surfaces of the internal cavity which are perpendicular to the cutting edge to such a smoothness that a low friction is obtained which allows design of the internal cavity with a constant cross-section matching the punched items on a considerable portion of its length measured from the cutting edge.

In order to facilitate punching from a stack or a pile comprising a large number of individual items in one operation a preferred embodiment of the punching apparatus according to the invention is characterized in that said internal cavity comprises a portion adjacent said cutting edge the wall surfaces of which match the shape of said items and a succeeding portion having increased cross-sectional area.

In the following the invention will be further explained with reference to the accompanying drawings wherein

Figure 1 schematically shows an embodiment of a punching apparatus according to the invention;

Figure 2 is a longitudinal sectional view of a punching die in the embodiment shown in Figure 1; and

Figure 3 shows the punching die in Figure 2 viewed in the direction towards the cutting edge.

In a label punching apparatus as illustrated in Figure 1 the starting material is a stack or a pile 1 comprising a large number of usually rectangular sheet sections each having an individual label print. Such sheet sections which are not shown in the drawing have been produced in a preceeding operation from a printed

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