

Title (en)

Method of manufacturing metal plate having hole, metal plate with hole, external gear with peripheral hole, external gear, metal plate for cam, method of manufacturing metal plate, and metal plate

Title (de)

VERFAHREN ZUR HERSTELLUNG EINER METALLPLATTE MIT EINEM LOCH, METALLPLATTE MIT EINEM LOCH, EXTERNES GETRIEBE MIT PERIPHERIELOCH, EXTERNES GETRIEBE, METALLPLATTE FÜR NOCKE, VERFAHREN ZUR HERSTELLUNG DER METALLPLATTE UND METALLPLATTE

Title (fr)

PROCÉDÉ DE FABRICATION D'UNE PLAQUE MÉTALLIQUE AYANT UN TROU, PLAQUE MÉTALLIQUE AVEC TROU, ENGRENAGE EXTÉRIEUR AVEC TROU PÉRIPHÉRIQUE, ENGRENAGE EXTERNE, PLAQUE MÉTALLIQUE POUR CAME, PROCÉDÉ DE FABRICATION D'UNE PLAQUE MÉTALLIQUE ET LADITE PLAQUE

Publication

EP 2926921 A2 20151007 (EN)

Application

EP 15159191 A 20150316

Priority

- JP 2014054022 A 20140317
- JP 2015033379 A 20150223

Abstract (en)

A method of manufacturing a metal plate having a hole in which an inner surface of the punched hole is a smooth surface, a metal plate with hole manufactured by the method, an external gear with peripheral hole, an external gear, and a metal plate for cam are provided. The method of manufacturing a metal plate having a hole includes a punching step of performing punching to a metal plate material placed on a die (5) by a punch (1) to form a through hole (8). In the punching step, breaking occurs during the punching for the through hole, a temporarily residual portion which is a peripheral edge of the through hole on the die side and protrudes inward from a position corresponding to an inner surface of the through hole (8) is formed, and thereafter, with the punching, the temporarily residual portion is pressed toward a side surface of the punch by a pressing surface (3) included in a distal end edge of the punch to have a smooth surface (71). The recessed portion forming step can be further included.

IPC 8 full level

B21D 28/02 (2006.01); **B21D 28/16** (2006.01)

CPC (source: EP)

B21D 28/02 (2013.01); **B21D 28/16** (2013.01)

Citation (applicant)

- JP 2002206563 A 20020726 - NAKANISHI METAL WORKS CO
- JIS B0601, 2013
- ISO 4287, 1997

Cited by

CN105935881A; CN114178381A; JP2021104516A

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

EP 2926921 A2 20151007; **EP 2926921 A3 20151230**; **EP 2926921 B1 20201028**; JP 2015193043 A 20151105; JP 6567292 B2 20190828; TW 201607637 A 20160301; TW I641433 B 20181121

DOCDB simple family (application)

EP 15159191 A 20150316; JP 2015033379 A 20150223; TW 104108121 A 20150313