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(54) Method for producing electrical contacts that can be applied in particular to the web of rails and the like

(57) A method for producing electrical contacts (30) that can be applied in particular to the web of rails and the like, the method consisting in the steps of:

- preparing a stub (1) of copper pipe having gauged dimensions,
- inserting the stub (1) in a die (10) of a press,
- performing a cold deformation to form a flanged head at the end of an internally hollow stem (21), and
- extracting the resulting electrical contact (30) from the die.

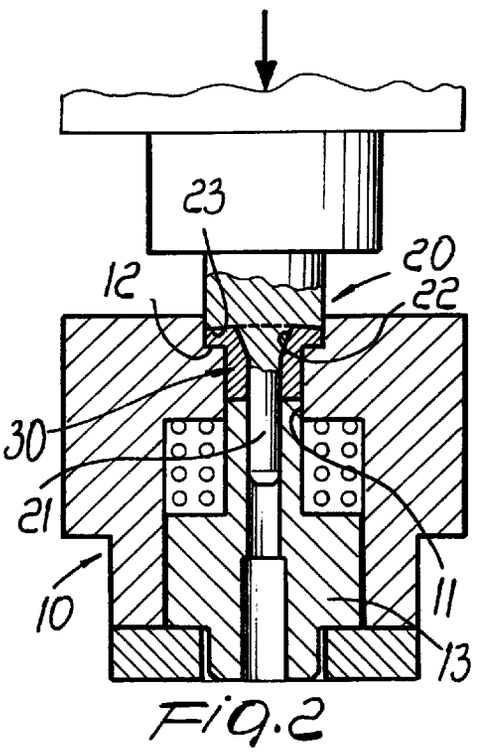

Fig.2

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Description

The present invention relates to a method for producing electrical contacts that can be applied in particular to the web of rails and the like.

Electrical contacts are conventionally used, especially in the railroad field, that can be applied to the web of rails and the like and are substantially constituted by a body that forms an internally hollow stem, which is connected, at one end, to an enlarged flange.

The stem can be inserted in a hole formed in the web of a rail and is fixed by means of a mechanical deformation performed by extrusion.

These contacts are usually produced by using either a perforated bar or a solid rod the outside diameter whereof is equal to, or slightly larger than, the size of the flange of the electrical contact, subsequently subjecting the material to chip-formation machining to achieve the desired shape.

This machining requires a very long time and accordingly entails very high costs, also in view of the fact that considerable waste of material occurs.

The possible use of copper containing additives, such as for example tellurium, strontium and the like, while improving machinability on the one hand, allowing to reduce machining times, on the other hand drastically reduces the ability to withstand deformation during extrusion in the web of the rail, thus facilitating the formation of cracks and/or breakages.

It should also be noted that cracks can be triggered by the machining marks, rough areas or the like, that are inevitably present on the contact surface due to chip-formation machining.

Another drawback resides in the fact that good size uniformity is difficult to maintain owing to the inevitable wear of the tools.

A principal aim of the invention is to eliminate the drawbacks described above by providing a method for producing an electrical contact that allows to drastically simplify all operating steps, thus obtaining a product that is not subject to cracks or the like.

Within the scope of the above aim, a particular object of the invention is to provide an electrical contact that is particularly adapted for carrying coded currents and the return of the electric traction current on lines equipped with an automatic locking system; it is also possible to use the contact in a supply, receiving, and "Z" connection in track circuits using a single stretch of rail, in return connections for the electric traction current, as reentry to a sub-station, in electric traction connections on cast-manganese steel frogs of switches, in connections between a metallic structure and the return rails with electric traction, and in electrical drainages from metallic and buried structures towards tracks and the like.

Another object of the present invention is to provide an electrical contact that is capable of giving the greatest assurances of reliability and safety in use by means of its particular constructive characteristics.

Another object of the present invention is to provide a method for producing electrical contacts that can be applied particularly to the web of rails and the like and can be easily obtained with simple and inexpensive machining operations.

This aim, these objects, and others that will become apparent hereinafter are achieved by a method for producing electrical contacts that can be applied in particular to the web of rails and the like, according to the invention, characterized by the steps of:

- preparing a stub of copper pipe having gauged dimensions,
- inserting said stub in the die of a press,
- performing a cold deformation to form a flanged head at the end of an internally hollow stem, and
- extracting the resulting electrical contact from the die.

Further characteristics and advantages of the invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of a method for producing electrical contacts that can be applied in particular to the web of rails and the like, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a sectional view of the step for inserting the copper pipe stub in a die;
figure 2 is a schematic view of the cold-deformation step;
figure 3 is a view of the extraction of the resulting electrical contact from the die;
figure 4 is a schematic perspective view of the resulting electrical contact;
figure 5 is a schematic sectional view of the electrical contact applied to the web of a rail and the like.

With reference to the above figures, the method for producing electrical contacts that can be applied in particular to the web of rails and the like consists in providing a copper pipe stub 1 having gauged dimensions and which is free of any kind of impurity.

The stub 1, cut into pieces of appropriate length, is converted into the finished product by means of a cold deformation, in a die on an automatic press, without resorting to chip-formation machining.

More specifically, a die 10 is provided which forms an axial channel 11 that ends with an enlarged portion 12 in an upward region.

A secondary die part 13 is arranged in the channel 11 and acts as a resting element for the axial end of the stub 1.

In order to perform cold deformation, a punch 20 is inserted by means of an automatic press; said punch has a stem 21 that is connected to a shoulder 23 by means of a frustum-shaped wider portion 22.

The stem 21 in practice enters the tubular stub 1 and the frustum-shaped wider portion 22 forms a flared

part at the flange region that is delimited between the wider portion 12 and the shoulder 23.

Once cold-deformation has ended, the secondary die part 13 is actuated so as to extract the contact 30.

Since the contact 30 is produced by cold-deformation, it always has a very high dimensional and quality standard, with a constantly uniform finish degree that is beyond compare with what can be obtained by chip-formation machines.

Furthermore, during the subsequent extrusion step for applying the electrical contact to the rail, behavior is more plastic, and the absence of sharp corners and of the typical roughness produced by tools practically eliminates the risk of cracks and breakages during installation, making the product highly safe and reliable.

In order to further improve the intrinsic characteristics of the resulting contact, it is possible to subject the contact, after cold-deformation, to a thermal treatment that limits any tensions caused by work-hardening produced by deformation, so as to obtain an average grain size of 11 to 30 μm.

With the above-described process there is no machining waste, except for the minimal waste caused by the cutting of the stubs of tubular element; therefore, a much smaller amount of metal is used with respect to chip-formation machining.

It should also be added that in addition to obtaining a product that is qualitatively far superior to the product that can be obtained by chip-formation, significantly lower production costs are also achieved.

From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that providing the contact by cold-deformation of a copper tubular element allows to have a final product the functional characteristics whereof are considerably improved with respect to the contacts of the prior art produced by chip-formation.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A method for producing electrical contacts that can be applied in particular to the web of rails and the like, characterized by the steps of:
   - preparing a stub of copper pipe having gauged dimensions,
   - inserting said stub in the die of a press,
   - performing a cold deformation to form a flanged head at the end of an internally hollow stem, and
   - extracting the resulting electrical contact from the die.

2. A method according to claim 1, characterized in that said electrical contact produced by cold-deformation is subjected to a thermal treatment to eliminate tensions produced by work-hardening caused by deformation.

3. A method according to claim 2, characterized in that the thermal treatment is performed until an average grain size between 11 and 30 μm is obtained.

4. A die for producing an electrical contact, characterized in that it comprises a die body forming a cylindrical channel ending with an enlarged portion in an upward region and closed, at the bottom, by a secondary die part, a deformation punch being also provided which has a stem connected to a shoulder by means of a frustum-shaped wider portion.

5. A die according to claim 4, characterized in that said secondary die part is movable to extract the produced electrical contact.

6. An electrical contact, particularly applicable to the web of rails and the like, characterized in that it is formed by means of the cold-deformation, in a die of a press, of a copper tube stub having gauged dimensions.

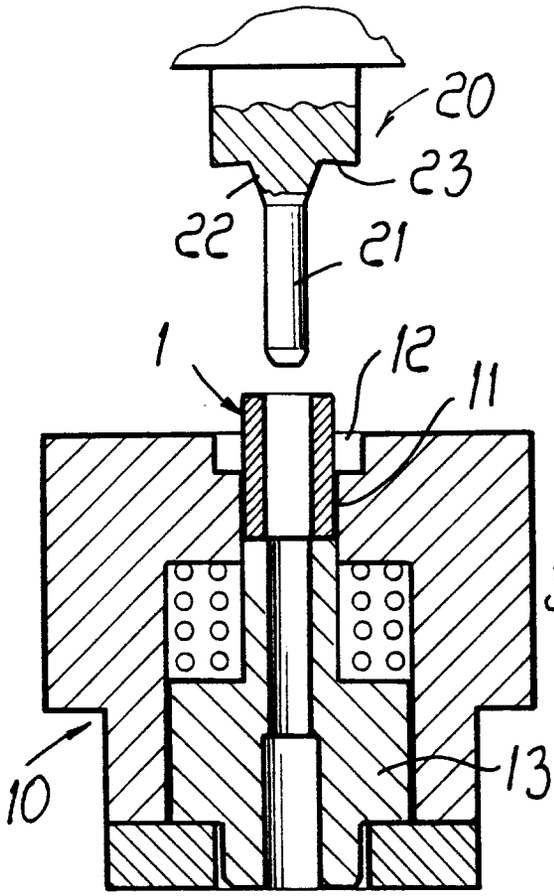

Fig.1

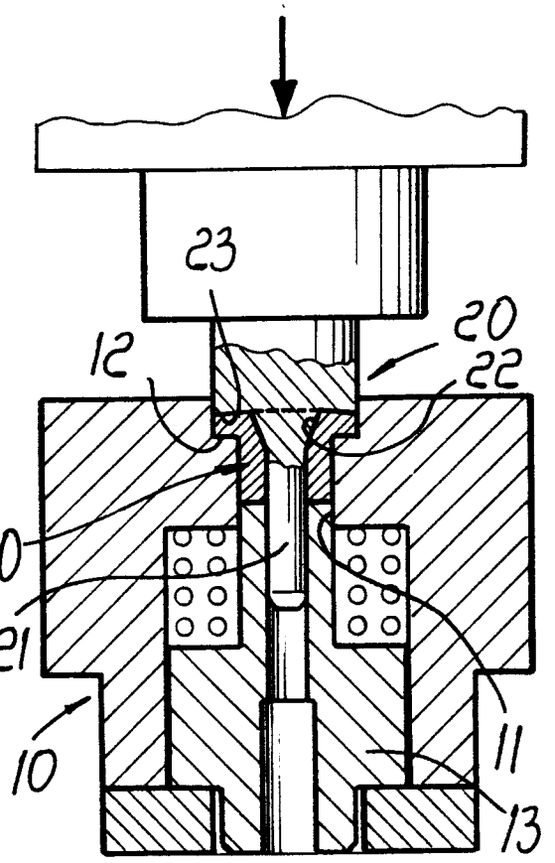

Fig.2

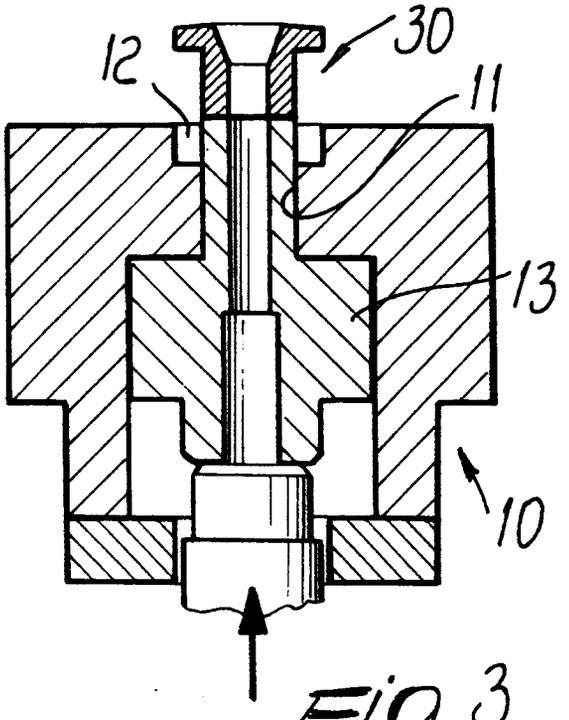

Fig.3

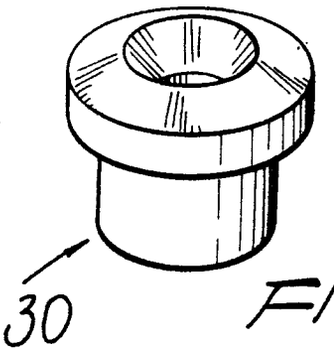

Fig.4

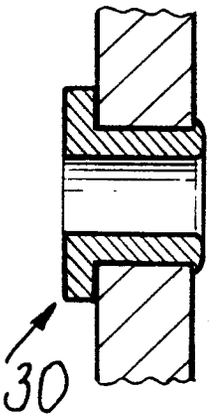

Fig.5