April 27, 1926. 1,582,052

R. E. KLAGES

MEANS FOR AND METHOD OF FORMING SLOTS IN METALLIC MEMBERS

Filed August 4, 1922

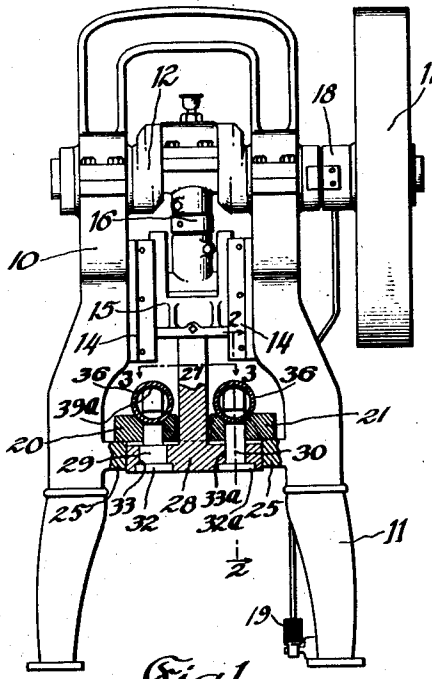


Fig. 1

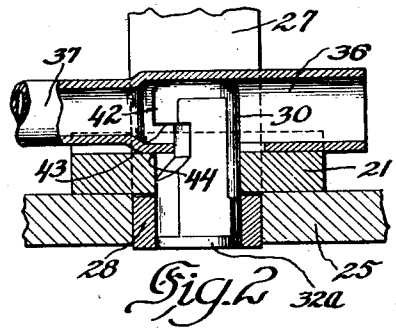


Fig. 2

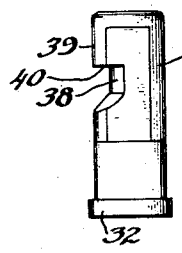


Fig. 4

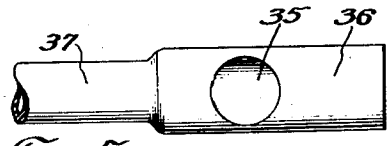


Fig. 5

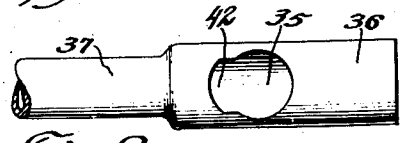


Fig. 6

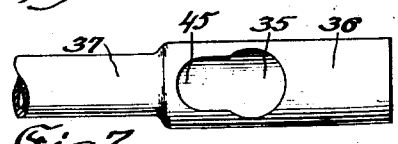


Fig. 7

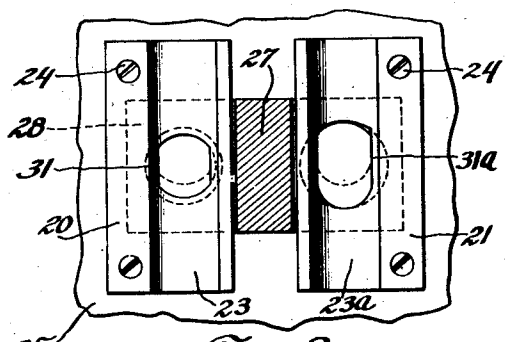


Fig. 3

Witness:-
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Reynold E. Klages
By his Attorney
Lloyd Blackwood

Patented Apr. 27, 1926.

1,582,052

UNITED STATES PATENT OFFICE.

REYNOLD E. KLAGES, OF COLUMBUS, OHIO.

MEANS FOR AND METHOD OF FORMING SLOTS IN METALLIC MEMBERS.

Application filed August 4, 1922. Serial No. 579,729.

To all whom it may concern:

Be it known that I, REYNOLD E. KLAGES, a citizen of the United States, and a resident of the city of Columbus, county of Franklin, and State of Ohio, have invented certain new and useful Improvements in Means for and Methods of Forming Slots in Metallic Members, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

This invention relates to means for, and method of, forming slots or elongated openings in tubular and other metallic members, and more particularly to means for, and method of, forming slots or elongated openings in tubular walls of drag links for automobiles.

One of the objects of the invention is the provision of new and improved means whereby an opening in a drag link or in any tubular member may be enlarged or elongated.

Another object of the invention is a new and improved process for forming non-circular and elongated openings in tubular members.

A still further object of the invention is means for enlarging or extending holes or openings in metallic members.

Other and further objects and advantages of the invention will appear as the description proceeds.

The method herein described of forming non-circular openings in metallic members, such as plates, bars and more especially the method of elongating openings in the side walls of tubes, consists first in forming circular hodes and then enlarging or extending those holes with suitable mechanism.

Since mechanism for forming circular holes in metallic members of all kinds is old and well known in the art, it is not thought necessary to show and describe a device for accomplishing this function.

One of my new and improved devices for extending and enlarging holes or openings in metallic members is shown in the accompanying drawings, in which:

Figure 1 is a front elevation, parts in section;

Figure 2 is a vertical section on line 2—2 of Figure 1, parts broken away;

Figure 3 is a section on line 3—3, with the work removed;

Figure 4 is a detail view showing one of the punch members or tools; and

Figures 5, 6 and 7 are views of one end of a drag link showing different steps in the development of the hole or opening formed therein.

On the drawing, the numeral 10 designates one form of punch machine by means of which the process of enlarging or elongating a hole in the side wall of a tube, may be accomplished. The supports or frame of the machine and the operating means may be of any usual or well known construction. As shown, the machine 10 is provided with the frame 11 which constitutes supports for the device and in the upper portion of which is journalled a crank shaft 12 located above guides 14. A head or slide bar 15 is adapted to be reciprocated within said guides on the rotation of said crank shaft through the connecting link or pitman 16 which is pivotally connected with said head and crank shaft in the usual or well known manner.

The device is adapted to be operated by any proper means. Preferably, it is power operated, the power being applied to the wheel or pulley 17 in the usual manner. A clutch 18 operated by the foot pedal 19 is provided for controlling the rotation of the crank shaft 12, as is usual in such constructions.

The frame 11 is provided with means for supporting the dies 20 and 21, such as the ledge 25. The dies 20 and 21 may be considered as forming a die block. The die block is secured to the frame 11 in any convenient manner as by means of the cap screws 24 which are adapted to secure the ends of the dies to the ledge 25.

The dies 20 and 21 are provided with grooves or recesses 23 and 23^a, respectively, which are shaped to conform to the external periphery of the metallic members that are to be operated upon. These dies are spaced apart a sufficient distance to permit the reciprocation of the tool holder or plunger 27 between them. The plunger is rigidly secured to or integral with the head 15 and movable therewith. The lower end of the plunger terminates in or is rigidly connected to a punch or tool holder 28.

Suitable tools or punch members 29 and 30 are secured in any suitable manner to

the holder 28 and are adapted to extend upwardly therefrom and slidably engage through openings 31 and 31ª in said dies 20 and 21, respectively. These openings are preferably made to conform to the shape of the tools for the purpose of guiding the same during their operation. Any suitable means may be provided for securing the punch members to the holder 28. As shown, the punch members terminate in flanged lower ends 32, 32ª which are adapted to engage in corresponding counter-bores in the lower ends of the openings 33, 33ª in the holder. The punch members are inserted from below and are adapted to be frictionally held in the openings, the flanges on the punch members seating in said counter-bores and holding the tools firmly in position during the punching operation. Any other suitable means may be provided for holding the punch members in the holder.

In certain classes of articles, as for instance in drag links, it is necessary to elongate a comparatively small opening to a material extent. In order to accomplish this it is necessary to repeat the punching or piercing process one or more times, or provide a plurality of punch members which are adapted to successively operate on the article, because a punch member that is small enough to enter the original opening or opening of the required size cannot be made strong enough to enlarge or elongate that opening to the desired extent at one operation.

For the purpose of illustration, I have shown means for enlarging or elongating openings in a drag link in two operations. I have also shown a separate die and tool for each operation. It is understood, however, that the invention is not so limited.

The punch member or tool 29 is made small enough in cross section to enter the original opening 35 formed in any suitable manner in the enlarged end member 36 of the drag link 37, see Figures 1 and 5. The member 29 is provided with a reduced or throat portion 38 which is shaped to fit the peripheral edge of one side of the opening or hole 35 to thereby determine the direction of the elongation. If the hole or opening 35 be circular as shown on the drawing, the convex throat portion is curved to the same radius. An overhanging head portion 39, which may have its extremity curved as at 39ª to conform to the concavity of the tube to be operated upon, is provided with a shearing, punching or cutting edge 40 which is adapted to cooperate with a corresponding shearing or cutting edge formed on the die 20 to shear or cut out a portion of the member 36 to form the extension 42 to the opening 35. (See Figures 4 and 6.)

The tool or punch member 30 for the die 21 is similar to that just described. It is, however, longer and stronger as indicated in Figure 2. Since this tool operates after the other, the tool may be made of a thickness corresponding to the width of the extension 42 and a width corresponding to the combined length of the two openings. This tool or punch member is also provided with a corresponding shearing, punching or cutting edge 43 which is adapted to cooperate with the shearing or cutting edge 44 formed on the die 21 for further enlarging or extending the opening in the member 36 as indicated at 45 in Figure 7.

It will be noted that the cutting edges of both tools or punching members are in rear of the holder 28. In other words, the support 28 precedes the cutting or shearing edge of the tool during the cutting or shearing operation. It will also be noted that the cutting edge of the tool being straight and that of the die being curved, their cooperation is more nearly like a shearing than a punching operation.

When it is desired to form elongated openings in metallic members, as for instance forming the usual key-hole shaped openings in drag links, a circular hole or opening 35 is first formed in the usual or any manner, after which the link is placed in the die with the tool or punch member 29 extending into the tube through the hole 35 with the tool at the upper limit of its movement. The tube or link is then pushed forwardly causing the periphery of the hole or opening 35 to come into contact with the throat 38 after which the machine is operated to cause the tool to descend to shear or cut out a portion of the tubular wall, thus enlarging the hole as indicated in Figure 6. The hole is further enlarged or elongated by repeating the process either in the same die or preferably by removing the tube to the other die and operating upon it with the other tool.

If it is desired to form an open slot in the end of a tube, the tube is placed in the die and advanced as before and the punch or tool member is operated to remove a portion of the wall of the tube outwardly to form the slot.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled in the art, and that various changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim:

1. A method of forming an elongated opening in a hollow metallic member, which consists in first forming an opening through the wall of said hollow member and then nibbling portions outwardly away from the wall about said opening.

2. A method of forming an opening in a

tubular member which consists in first forming an opening in the wall of said member and then inserting a tool and nibbling the wall away by withdrawing said tool.

3. In a device of the class described, a die member provided with an opening therethrough and over which material may be passed for working, a tool or punch member movably mounted in said opening and provided with a hooked end, and means for reciprocating the hooked end of said tool through said opening.

4. In a device of the class described, a die member having a curved recess for the reception of a tubular member and provided with an opening extending therethrough at right angles to said recess, a punch member movable in said opening, said punch member provided with a cutting edge for cooperating with said die for cutting or punching out portions of the wall of metallic tubes placed in the recess of said die, and means for reciprocating said punch member.

5. A punch or cutting tool comprising a body portion, means for attaching the same to a holder, a reduced or neck portion having a convex surface secured to said body portion, and a head secured to said reduced portion and provided with a cutting edge offset from said convex surface, said head having its extremity curved at right angles to the curvature of said convex surface substantially as shown and described.

6. In a device of the class described, a frame, a die block supported on said frame and provided with parallel curved recesses on its upper surface for the reception of metallic tubular members, and having an opening extending from each recess downwardly through said block, a holder mounted for reciprocation beneath said block, punch members or tools secured to said support and extending upwardly through said openings, said punch members being provided with reduced portions having convex surfaces for engaging the peripheral edge of holes formed in said tubular members, and having head portions adapted to enter said holes and provided with cutting edges overhanging said convex surfaces, the distance between the cutting edge and convex surface of one tool being greater than the other, and means for reciprocating said support.

In testimony whereof I affix my signature.

REYNOLD E. KLAGES.