Oct. 30, 1956 W. HANKE 2,768,540

METHOD OF AND MEANS FOR PRODUCING HEADS ON METAL WIRE OR ROD

Filed April 28, 1953 2 Sheets-Sheet 1

FIG. 1.

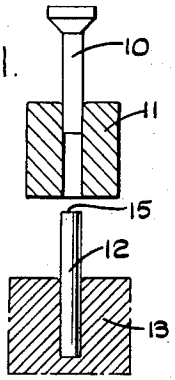


FIG. 2.

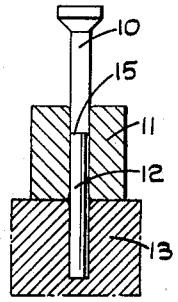


FIG. 3.

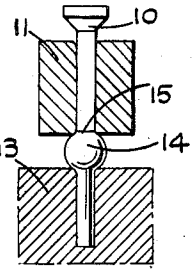


FIG. 4.

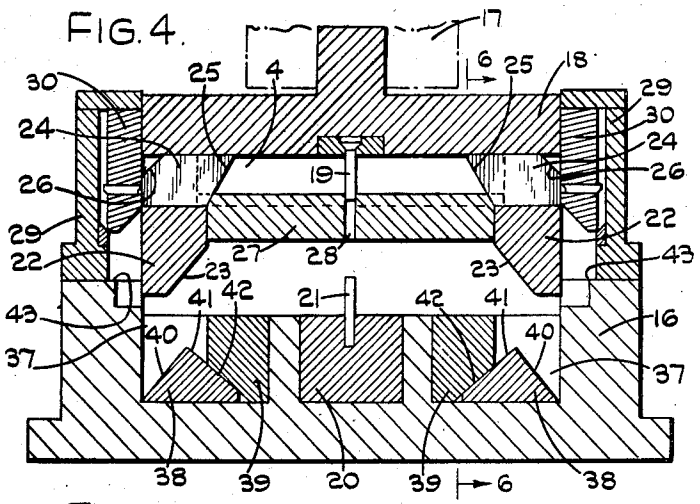
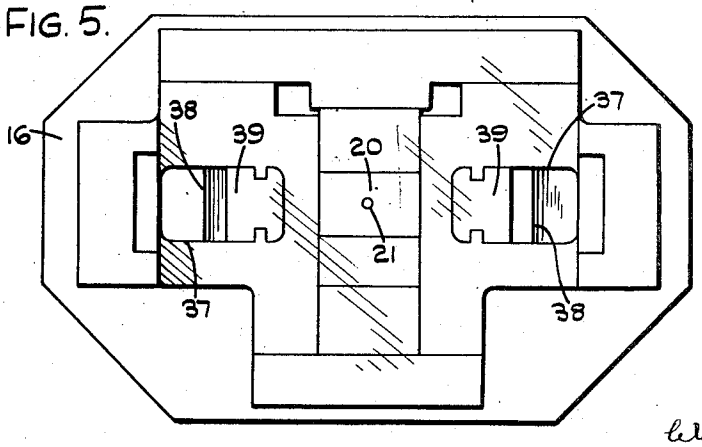


FIG. 5.



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FIG. 6.

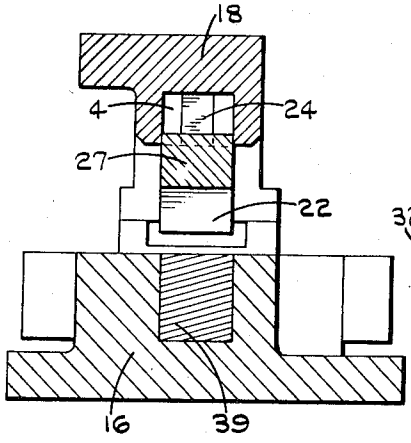


FIG 7.

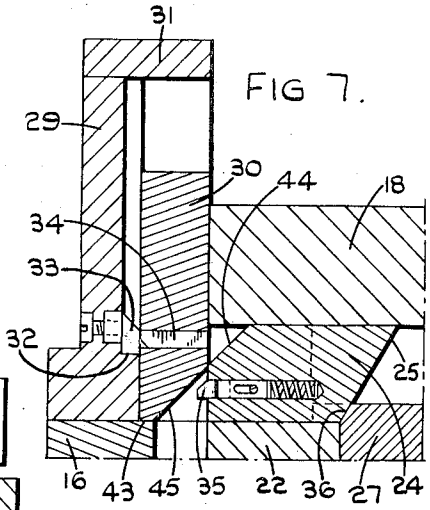


FIG. 8.

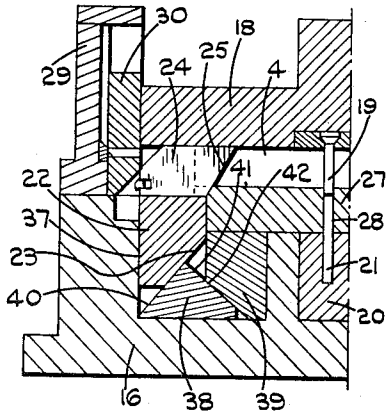
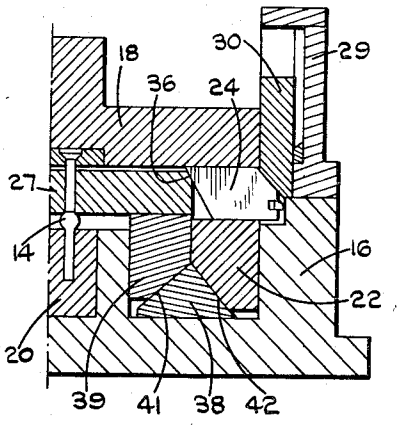


FIG. 9.



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METHOD OF AND MEANS FOR PRODUCING HEADS ON METAL WIRE OR ROD

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Application April 28, 1953, Serial No. 351,647

2 Claims. (Cl. 78—62)

This invention relates to a method of and means for the production of heads upon metal wire or rod and is particularly, though not exclusively, applicable to the process known as "cold heading" in which the wire or rod, hereinafter known as "the work," is suitably held against endwise movement and has its end upset or expanded by an axially moving punch acting on the end of the work. In some cases the displaced metal forming the head is forced into a surrounding die so that a definite shape is applied to it. In other cases the head so formed by upsetting is subsequently machined or otherwise worked to the required shape.

In known cold heading machines it is accepted that the length of that portion of the work which is to be upset to form the head must not exceed a length which is of the order of two to two and a half times the diameter of the rod or wire, so that the size of the head is limited thereby. A greater length than this is unstable and the metal is very liable to bend laterally.

The object of the present invention is to enable larger heads to be formed than hitherto.

According to the present invention I provide a method of heading in which the portion of the work which is to be headed is supported against lateral bending during the heading operation by supporting means surrounding and engaging the said portion, which are capable of controlled movement independently of the movement of the punch, such controlled movement being in a direction so as to cause the supporting means to progressively uncover the said portion whilst the punch is moving in the opposite direction whereby the metal of said portion is expanded progressively into the progressively increasing gap between the work-holder and the supporting member.

For instance, that portion of the work which projects from the work-holder and is to be upset or expanded by the punch may be supported against bending by an external sleeve having an opening through which the punch moves. The arrangement may be such that the sleeve is slidably mounted on the punch and at the commencement of the heading operation a portion of it projects from the end of the punch and slidably engages around the projecting end portion of the work. As the punch moves relatively to the work to perform the heading operation, the sleeve is withdrawn by moving it on the work and on the punch in the opposite direction to the movement of the punch so that a progressively increasing length of the work between the work-holder and the end of the sleeve is uncovered by the sleeve and permitted to flow laterally so as to form the head. The operation may continue until the sleeve moves into a position in which its end reaches or passes beyond the end of the work.

When heading commences, the sleeve may start to move in the opposite direction to the movement of the punch. Alternatively, when the punch first engages the end of the work there may be a gap between the end of the sleeve and the work-holder, so that some heading takes place before the sleeve starts to move.

The size of the finished upset portion of the work may be altered by a variation in the speed of the sleeve relative to that of the punch.

The invention is illustrated in the accompanying drawings wherein:

Figures 1, 2 and 3 are diagrammatic views showing three stages in the operation of forming a head on a blank.

Figure 4 is a section through part of a press showing one arrangement of tools and operating means for carrying out the method according to the invention, the ram of the press being shown in the raised position prior to the commencement of a stroke.

Figure 5 is a plan view of the bed of the press, the upper tools being removed.

Figure 6 is a section on the line 6—6 in Figure 4.

Figure 7 is a detailed view on an enlarged scale.

Figure 8 is a part view similar to Figure 4 showing the parts in position at the beginning of the actual heading operation, corresponding to the position shown in Figure 2.

Figure 9 is another view showing the position immediately after the heading operation, corresponding to Figure 3.

Referring firstly to Figures 1, 2 and 3, these views show three stages in the method of forming an enlarged head on a piece of work which for convenience is shown as a single blank of wire or rod.

The numeral **10** indicates the punch, **11** refers to the supporting means, shown here as a sleeve surrounding the punch, **12** indicates the blank and **13** indicates the work-holder.

Figure 1 shows the position at the commencement of the full operation with the punch and sleeve raised clear of the blank. In the position shown in Figure 2 the punch and sleeve have moved downwardly until the sleeve **11** engages the work-holder **13** and the punch engages the end of the blank. After this, whilst the punch continues with its downward movement, the sleeve **11** is moved upwardly at a controlled speed so that the metal of the blank is upset into the progressively increasing gap between the sleeve **11** and work-holder **13** until the position shown in Figure 3 is reached where the sleeve has almost moved clear of the end of the blank and a head **14** has been formed. During the forming of the head the end **15** of the blank is continually supported by the sleeve.

Figures 4 to 9 show one form of apparatus by which the above described method of heading may be carried out. The bed of a press is indicated at **16** and the ram is shown at **17**, the remainder of the press not being shown as this would be of any known form and does not form part of the present invention.

Connected to the ram **17** is a tool holder **18** which carries a heading punch **19** and the bed **16** of the press there is mounted a work-holder **20** having a recess aligned with the punch for receiving a blank **21**.

Connected to, or formed integrally with, the tool holder **18** on each side is a cam block **22** which has an inner inclined face **23** and mounted in a slot **4** between the tool holder **18** and the cam blocks **22** are two similar slidable cam blocks **24** each having inner inclined faces **25** and outer inclined faces **26**.

The supporting means (or sleeve **11** of Figures 1, 2 and 3) is in the form of a bar **27** having an opening **28** into which projects the punch **19**.

The bed **16** has at each side two upright pillars **29** and between each pillar **29** and the tool holder **18** there is slidably mounted a locking bar **30** which is shown in more detail in Figure 7. At the top of each pillar **29** there is a projecting flange **31** and near the bottom a shoulder **32** on which is mounted a small trip cam **33** which co-

operates with a slide **34** mounted in a slot in the bar **30**, also each cam block **24** has a recess in which is mounted a spring pressed catch **35** for co-operation with slide **34**.

The bar **27** is supported at its ends upon the upper faces of cam blocks **22** and at each end the bar has an inclined face **36** engaging face **25** of the cam block **24**.

At each side of the work-holder **20**, the bed has recesses **37** in which are loosely mounted cam blocks **38** and **39**, the former having inclined faces **40**, **41** and the latter having an inclined face **42**. The operation is as follows:

Commencing at the position shown in Figure 4, the tool holder **18** is in its upper position and the beam **27** is locked fixedly in relation to the tool holder because its inclined surfaces **36** are engaging the inclined surfaces **25** of cam blocks **24** each of which is locked against outward displacement by its engagement with the adjacent sliding block **30**, each block **30** being held in the upper position by means of the catch **35** engaging in the hole in which is mounted the slide **34**.

When the ram **17** moves downwardly the whole assembly of tool holder **17**, beam **27**, cam blocks **24** and sliding blocks **30** commences to move down bodily until each slide **34** engages its fixed trip cam **33** whereupon the slides **34** move inwardly to disengage the catches **35** and further movement downwardly of the blocks **30** is prevented by the shoulders **43** on the press bed **16**.

Further downwards movement of the ram brings the parts to the position shown in Figure 8 in which the bar **27** has engaged the upper face of the work-holder **20** and the blank **21** is entered within the hole **28** in the bar **27**. The punch **19** is engaging the upper end of the blank **21** and heading is about to commence. Also in this position the inclined faces **23** of cam blocks **22** and the inclined faces **40** of cam blocks **38** and the inclined faces **44** on cam blocks **24** have come into line with inclined faces **45** on the blocks **30** so that the cam blocks **24** are free to move outwardly.

Further downwards movement of the ram **17** causes cam blocks **22** to displace cam blocks **38** inwardly thus moving cam blocks **39** upwardly and raising the bar **27**. Under the action of the punch the metal of the blank expands into the progressively increasing gap between the work-holder **20** and the beam **27** and heading is completed.

The ram has now reach the bottom of its stroke and the parts occupy the position shown in Figure 9. Upward movement of the ram commences and when the blocks **30** engage the projections **31** their movement is arrested so that cam blocks **24** are moved inwardly and then upwardly until the catches **35** again engage with the holes in the blocks **30** to lock the assembly in its initial position, the cam blocks **38**, **39** having moved back to their original positions. A fresh blank, having been inserted the operation proceeds as before.

What I claim then is:

1. In a machine for producing heads on metal wire or rod comprising a tool holder, a punch fixedly mounted in said tool holder, a work holder for holding a blank and means for moving said tool holder towards and away from said work holder to perform heading operations; means for supporting a blank against lateral bending during the heading operation comprising a bar carried by the tool holder and having an opening therethrough in line with said punch so as to surround and engage the blank, cam means fixedly associated with said tool holder comprising a cam block on each side of the punch having its inner operative face inclined downwardly and outwardly and co-operating cam means movably associated with said work holder comprising cam blocks loosely mounted in the bed of the work holder on each side thereof and adapted to engage the side of said bar nearest to the work holder when operatively engaged by the cam blocks carried by the tool holder so as to cause movement of the bar away from the work holder.

2. A machine according to claim 1 having two further cam blocks mounted in the tool holder above said bar said further cam blocks being adapted for lateral sliding movement at right angles to the direction of movement of the punch, the upper side of the bar being provided with surfaces which are engaged by said further cam blocks, locking means for locking said further cam blocks in the position which locks the bar fixedly to the tool holder and means for automatically releasing said locking means at a predetermined point during movement of the tool holder prior to the commencement of the actual heading of the blank.

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