

May 6, 1969

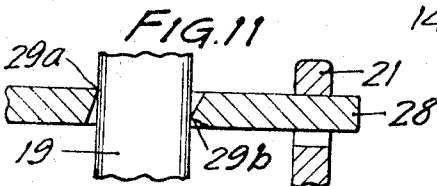
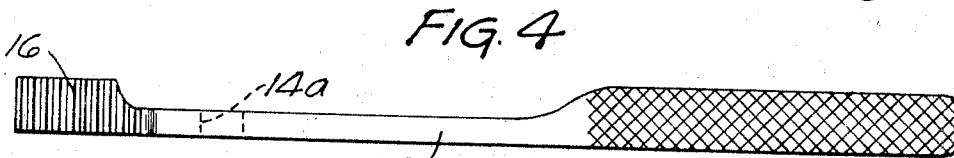
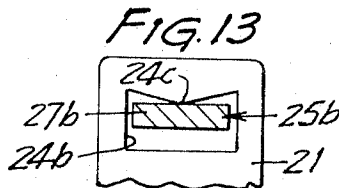
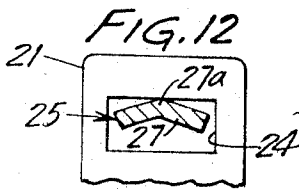
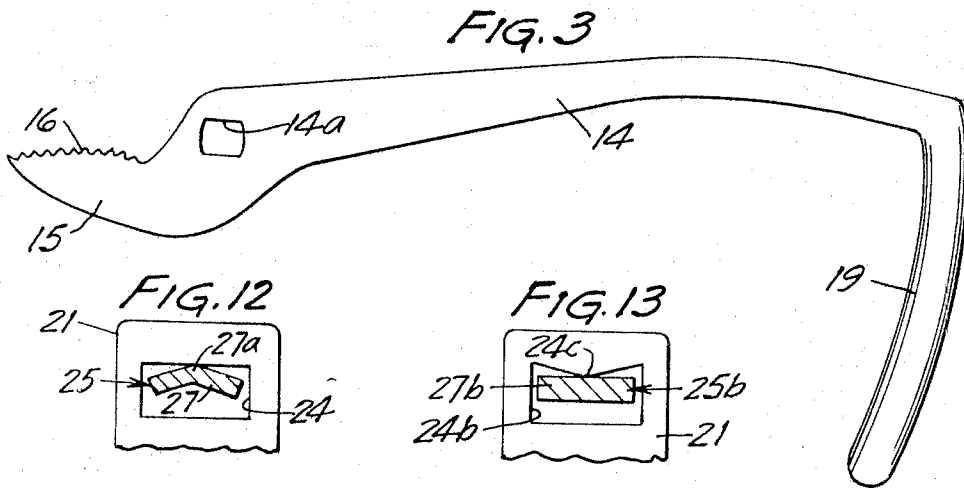
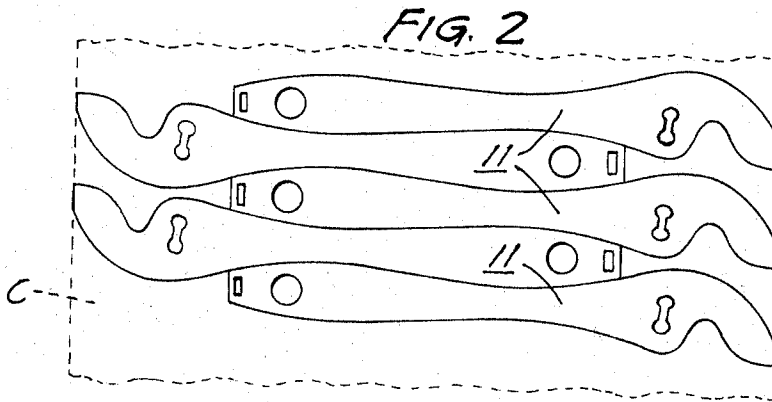
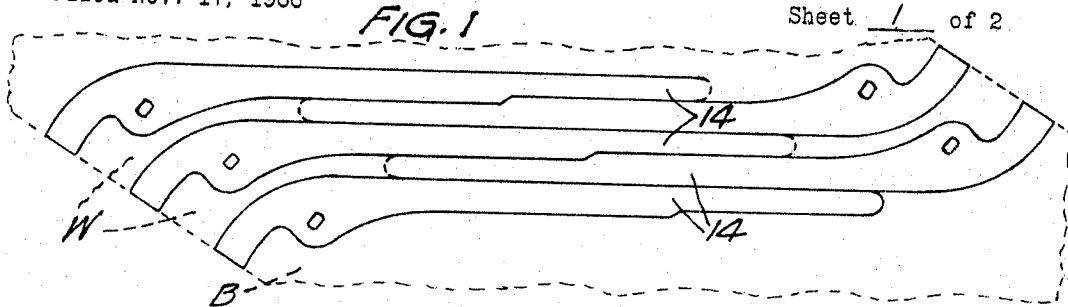
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3,442,159

METHOD OF MAKING PLIERS

Filed Nov. 17, 1966

Sheet 1 of 2



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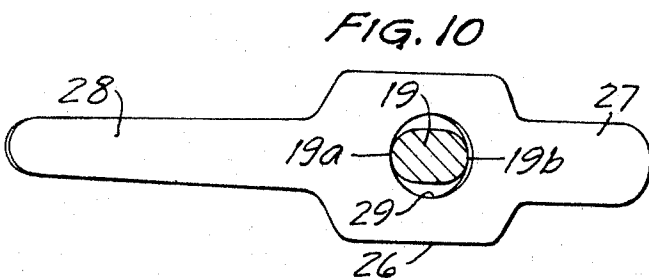
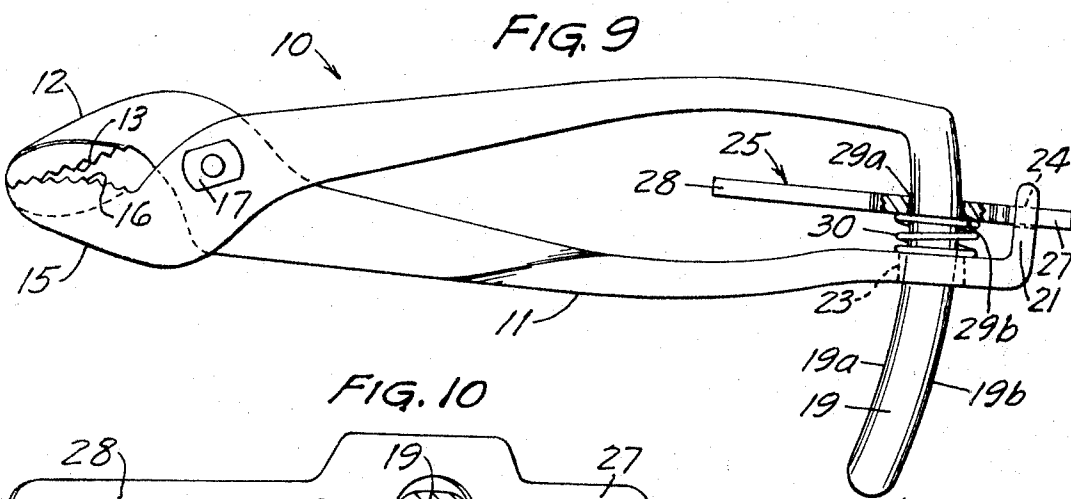
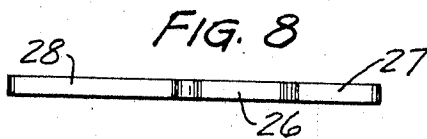
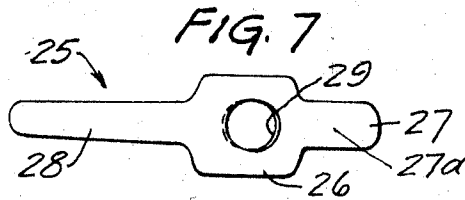
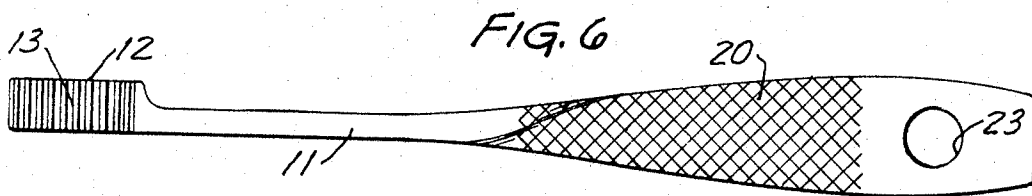
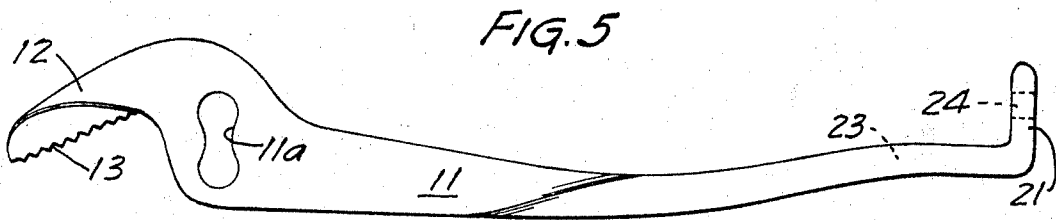
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Sheet 2 of 2



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3,442,159

METHOD OF MAKING PLIERS

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3 Claims

This invention relates to a novel hand tool, specifically pliers, and the method of making the same.

Heretofore, hand tools and specifically pliers have been conventionally made through forging and the use of high temperatures in a forging operation results in a change in the crystalline structure of the metal. The metal of forged tools in some instances has therefore been found to fail when subjected to certain strains and stresses. Further, tool forging operations are not only time consuming but are also quite expensive.

It is therefore a general object of this invention to provide a novel process for forming pliers through a stamping and shaping operation wherein conventional pliers are continuously stamped from a blank of material in a manner to minimize wasting material. When pliers having a locking mechanism associated therewith are produced, the two respective handle members of the pliers are of somewhat different configuration from each other. In the present process, a pair of one kind of handle members is simultaneously stamped from a blank of material and each handle member is thereafter shaped to the desired configuration. The present operation not only can be carried out in a relatively rapid manner, but in the present process, the pliers may be produced so that there is very little waste material which results from the stamping and shaping operation. It is further pointed out that the particular locking pliers, produced in accordance with the novel process, also includes a self-aligning locking feature which is operable to prevent undesirable binding of the locking means of the pliers.

These and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a diagrammatic illustration showing the pattern of how one of the parts of the pliers are stamped from a blank of material;

FIG. 2 is a view similar to FIG. 1 illustrating the pattern followed in stamping the other part of the pliers;

FIG. 3 is a side elevational view of one of the parts illustrating a further shaping step;

FIG. 4 is a plan view of the part illustrated in FIG. 3;

FIG. 5 is a side elevational view of the part illustrated in FIG. 2 but after having been subjected to an additional shaping and forming step;

FIG. 6 is a plan view of part illustrated in FIG. 5;

FIG. 7 is a plan view of the locking member of one embodiment of pliers made in accordance with the present process;

FIG. 8 is a side elevational view of the locking member;

FIG. 9 is a side elevational view of one embodiment of the assembled pliers made in accordance with the present process;

FIG. 10 is a detail cross-sectional view of the locking mechanism illustrating the interrelation of certain parts thereof;

FIG. 11 is a detailed cross-sectional view of the locking mechanism illustrating the coaction of the locking member and the lock engaging member;

FIG. 12 is a detailed cross-sectional view illustrating the coaction and interrelation of the locking member and one of the handle members; and

FIG. 13 is a detailed cross-sectional view similar to

FIG. 12 but illustrating a modified form of the locking mechanism.

Referring now to the drawing and more specifically to FIG. 9 it will be seen that one embodiment of pliers made in accordance with the present process is there shown and is designated generally by the reference numeral 10. The particular pliers shown are of the locking type whereby the jaws of the pliers may be locked in predetermined relation, the pliers including certain novel features with respect to the locking mechanism. The pliers 10 include an elongate handle member 11 having an offset jaw portion 12 integrally formed at one end thereof, the jaw portion 12 having teeth 13 formed at the gripping face thereof. The pliers 10 also include handle member 14 which is of different configuration from the handle member 11, and handle member 14 also includes a jaw portion 15 integrally formed at one end thereof which is provided with teeth 16 disposed in opposed relation with respect to teeth 13. The handle member 11 is provided with an aperture 11a adjacent the jaw portion thereof, as best seen in FIG. 5, while handle member 14 is also provided with an aperture 14a therein as best seen in FIG. 3. A nut and bolt assembly 17 pivotally connects the handle members together in a well known manner.

Referring now to FIG. 4 it will be seen that the handle member 14 includes a hand grip portion 18 which has a knurled gripping surface and an elongate curved lock engaging element 19 is integrally formed with the handle member 14 adjacent the ends of the hand grip portion. Similarly, the handle member 11 has an enlarged hand grip portion 20 having a knurled surface thereon and an offset portion 21 is integrally formed with the handle member 11. Referring again to FIGS. 5 and 6 it will be noted that the handle member 11 is provided with an aperture 23 therethrough adjacent the knurled hand grip 20 thereof and that the offset portion 21 also has an opening 24 therein. The opening 23 is substantially circular while the opening 24 is elongate in a transverse direction with respect to the offset portion 21. It will be noted, as best seen in FIGS. 4 and 6, that the jaw portions of each of the handle members have relatively large width and thickness dimensions as compared to that part of the respective handle member located next adjacent the jaw portion.

The locking means of the pliers 10 includes a locking member 25 which in the embodiment shown in FIGS. 1-12, is formed of flat metallic material and comprised of an enlarged median portion 26, a lower portion 27, and an upper portion 28 which defines the handle of the locking member. The lower portion 27 of the locking member projects through the opening 24 in the offset portion 21, the lower end of the lower portion 27 being slightly expanded to prevent disengagement of the locking member from the opening 24. The enlarged median portion 26 of the locking member is provided with an aperture 29 which is also of substantially circular configuration and through which the lock engaging element 19 projects. A coil spring 30 is interposed between the handle member 11 and median portion 26 of the locking member 25 and normally urges the latter outwardly and away from the handle member 11 and towards the handle member 14. It will be noted that the lock engaging element 19 has an arcuate upper surface 19a and a lower arcuate portion 19b.

It will be seen that one relatively sharp arcuate edge portion 29a of the locking member 25 defined by the opening 29 engages the arcuate surface 19a of the lock engaging element 19 while another relatively sharp arcuate portion 29b of the locking member engages the arcuate surface 19b of the lock engaging element. It will be noted that sharpened arcuate surfaces 29a and 29b are axially spaced from each other. When these arcuate portions 29a

and 29b engage the opposed surfaces 19a and 19b of the lock engaging element, the respective handle members will be locked in predetermined relation with respect to each other. The locking surface 29a being spaced further away from the fulcrum 21 is subjected to less pressure than surface 29b. The locking member 25 is maintained in this relationship by the coil spring 30. In order to unlock the locking member 25, it is merely necessary to urge the upper portion 28 of the locking member towards the handle member 11. By having oppositely disposed sharpened locking surfaces on the locking member 25, the locking member will maintain its effective locking position with respect to locking engaging members.

In order to assure that the lock engaging element 19 may pass through the opening 29 of the locking member 25 and in order to prevent unnecessary binding of the handle members 11 and 14, and accidental unlocking of these handle members, the locking member 25 is supported in the apertured offset portion 21 to permit not only laterally swinging of the locking member but also permitting limited turning or twisting movement about its longitudinal axis as well as slight longitudinal translation. The rotation or twisting movement of the locking member 25 about its longitudinal axis with respect to the offset portion 21 is made possible by making one of the coacting surfaces on the offset portion 21 and locking member 25 slightly concave. In the embodiment of FIGS. 1-12, the surface 27a on the locking member is convex so that a slight rocking action may take place between this convex surface and the coacting surface on the offset portion 22 defined by the opening 24. However, in FIG. 13, one of the edges which defines the opening 24b is not straight but is of inwardly convex configuration to define a point 24c that is engaged by the flat lower portion 27b of the locking member. These coacting surfaces permit the locking member to rock slightly about its longitudinal axis.

In carrying out the novel process for stamping and forming the respective handle members of the pliers, reference is now made to FIG. 1 wherein it will be seen that the handle members 14 are stamped from a blank of material B. In each downward stroke of the stamping dies, a pair of the handle members 14 are simultaneously stamped from the blank B, each adjacent pair being arranged in opposite extending direction with respect to each other. At last a portion of adjacent handle members 14 have a common surface so that the only waste material which results from the stamping action is that designated W and which is located between the end portion of the handle members. Similarly, the handle members 11 are stamped from a blank C wherein each handle member is arranged in opposite extending direction to the next adjacent handle member 11. The handle members 11 are stamped in pairs thus obviating the necessity of turning the blank C or requiring returning of the dies so that the stamping operation which results in the stamping of the handle members 11 and 14 may be carried out in the continuous manner. It will be noted too that as in the case of the stamping operation involving the handle members 14, the stamping of the handle members 11 involves a minimum amount of waste since one surface of each handle member constitutes a mating surface of the next adjacent handle member. It will be noted that this common mating surface area of adjacent handle members extends throughout a major portion of the respective lengths of the handle members 11 and 14. It becomes quite apparent then that the waste produced by the stamping operation is only that material located between adjacent jaw portions of the handle members.

In most stamping operations it has been found that each part to be stamped ordinarily is spaced from the next adjacent part to be stamped by a distance corresponding to the thickness of the blank from which the articles are formed. However, by following the process steps set forth hereinabove it is unnecessary to make such a

spacing and not only may the stamping operation be carried out with a minimum of waste but the simultaneous stamping of identical pairs of handle members may be performed in a continuous line operation.

Referring again to FIGS. 1 and 2 it will be noted that the particular configuration of the general portions of each of the handle members that is produced from the stamping operation has a different configuration from that of the completed and finished pliers. To this end it will be noted that the thickness dimension of the handle members 11 and 14 corresponds, of course, to the thickness dimension of the blank B while the thickness dimension of the handle members 11 corresponds to the thickness of the blank C. The respective width dimension of the jaw portions of each of the handle members is substantially greater than the thickness dimension of the blank from which the handles were stamped. The apertures 11a and 14a in the handle members 11 and 14 respectively, are formed or punched during this initial stamping step. The aperture 23 is also punched in this first stamping step.

When the jaw portions are subjected to a further shaping operation wherein the metal is simultaneously compressed and coined to form the jaws 15 having teeth 16 it is unnecessary to trim any material from these jaws as they are ultimately shaped into their final form. During the shaping of the jaw 15 and the coining of teeth 16, the hand grip portion 18 is also formed and is knurled. A lock engaging element 19 is also bent into its curved configuration as shown in FIG. 3 and the respective arcuate cross sectional portions 19a and 19b are also formed during this shaping operation.

Similarly, with respect to the handle member 11, as the jaw portions thereof increase with respect to their thickness dimension during the second or shaping operation, the teeth 13 are also simultaneously coined during this shaping operation. The handle portion 20 and the knurling thereon are formed during this operation. The offset portion 21 is simultaneously formed during the shaping of the jaw portion and handle portion of the handle member 11. After the handle members 11 and 14 are completely formed, these members may then be subjected to heat treatment in a well known manner and these handle members may also be plated with a chrome plating if desired. Thereafter the handle members are pivotally connected together by the nut and bolt assembly 17.

It will be noted that in producing pliers by my novel method, the waste material normally attendant in the stamping of parts having irregular shaped peripheries is minimized, the only waste material being located between adjacent stamped handle members at the jaw end portion thereof. Since the major length of the handle member when first stamped from the blank of material constitutes a common mating surface with the next adjacent handle member, one edge of the blank will normally define one of the longitudinal surface portions of the next handle member to be stamped. In conventional stamping operations, it is necessary to space each stamping apart a distance corresponding to at least the thickness dimension of the blank.

By simultaneously stamping a pair of one kind of handle member from a single blank of material, the necessity of turning the die or alternatively turning the blank of material to minimize the waste is obviated. Assuming pliers could be stamped by following the steps of conventional stamping procedures, my process requires approximately half the time needed as compared to a conventional stamping operation. The life of the stamping dies is also substantially increased as compared with the dies in a conventional stamping operation.

From the foregoing description it will be seen that I have provided a novel process of making pliers which process involves stamping and shaping the handle members of the pliers from a blank of material, and therefore not only minimizing the waste material produced by such

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an operation, but also involves a process that can be very economically and rapidly carried out.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What is claimed is:

1. A method of making pliers of the type including a pair of lever type handle members pivotally connected together and each having jaw portions integrally formed with one end thereof, said method comprising simultaneously stamping a pair of handle members from a substantially flat blank, said handle members of each stamped pair extending in opposite directions, at least the major portion of the length of each simultaneously stamped pair of handle members having a common mating surface, thereafter shaping the jaw portion of each handle member to increase the width of the gripping surface thereof and forming gripping teeth at said gripping surface.

2. The method of making pliers as defined in claim 1 wherein the pliers are of the type having a pair of differently shaped handle members, one handle member having an elongate lock engaging element integrally formed with one end thereof and extending angularly therefrom, the other handle member having an offset mounting portion integrally formed with one end thereof, and wherein

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a pair of one kind of said handle members is simultaneously stamped from a blank of material in continuous successive stamping strokes so that an edge of the blank defines a longitudinal surface portion of one of the handle members of the next adjacent pair to be stamped.

3. The method as defined in claim 2 wherein the handle members having elongate lock engaging elements thereon are stamped so that the lock engaging element extends longitudinally from its associated handle member, and one longitudinal surface of the lock engaging element constitutes a portion of said common surface between adjacent handle members, said lock engaging element being thereafter bent into angularly extending relation with respect to the associated handle member.

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