

# United States Patent [19]

Spraker

[11] 3,816,900

[45] June 18, 1974

## [54] ROLLER CHAIN BREAKER

[76] Inventor: Lester L. Spraker, 803 East Somers St., Eaton, Ohio 45320

[22] Filed: Sept. 13, 1972

[21] Appl. No.: 288,541

[52] U.S. Cl. .... 29/267, 83/629, 74/422, 59/7

[51] Int. Cl. .... B21I 21/00

[58] Field of Search .... 29/267; 83/629, 633, 634; 74/422; 59/7

## [56] References Cited

### UNITED STATES PATENTS

570,930	11/1896	Hunter.....	83/629 X
608,725	8/1898	Stark.....	83/633 X
863,346	8/1907	Berry.....	83/633 X
1,884,398	10/1932	Uxley.....	83/633 X
2,904,955	9/1959	Kreiter.....	29/267 X

### FOREIGN PATENTS OR APPLICATIONS

618,276 3/1927 France..... 83/619

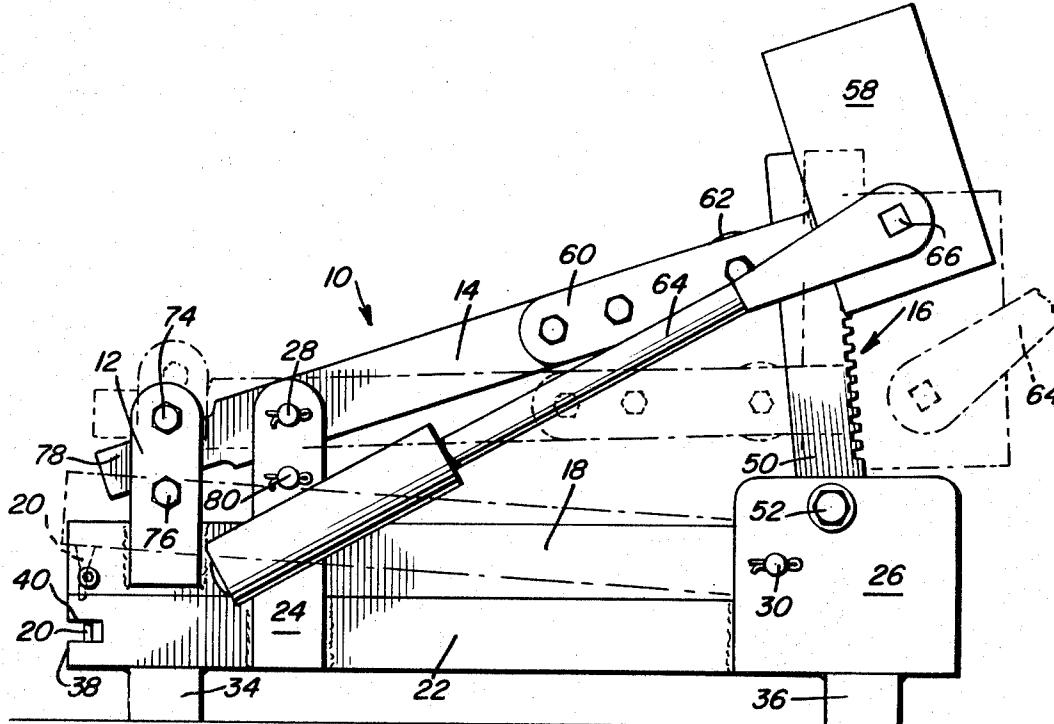
Primary Examiner—Al Lawrence Smith  
Assistant Examiner—Harold R. Smith, Jr.  
Attorney, Agent, or Firm—Harvey B. Jacobson

[57]

## ABSTRACT

A punching tool particularly for breaking roller chain and the like has a member connected to a pivotally mounted lever and a link. A rack and pinion arrangement permits selective pivoting of the lever for movement of the member and link. The link has one or more punches arranged thereon for engaging a work-piece arranged in a recess provided in a base member pivotally mounting the lever and link. A die communicates with the recess for cooperating with the punch during punching operations. Preferably, a plurality of punches and mating dies are provided for simultaneously punching out a plurality of roller chain pins.

18 Claims, 6 Drawing Figures



PATENTED JUN 18 1974

3,816,900

SHEET 1 OF 2

Fig. 1

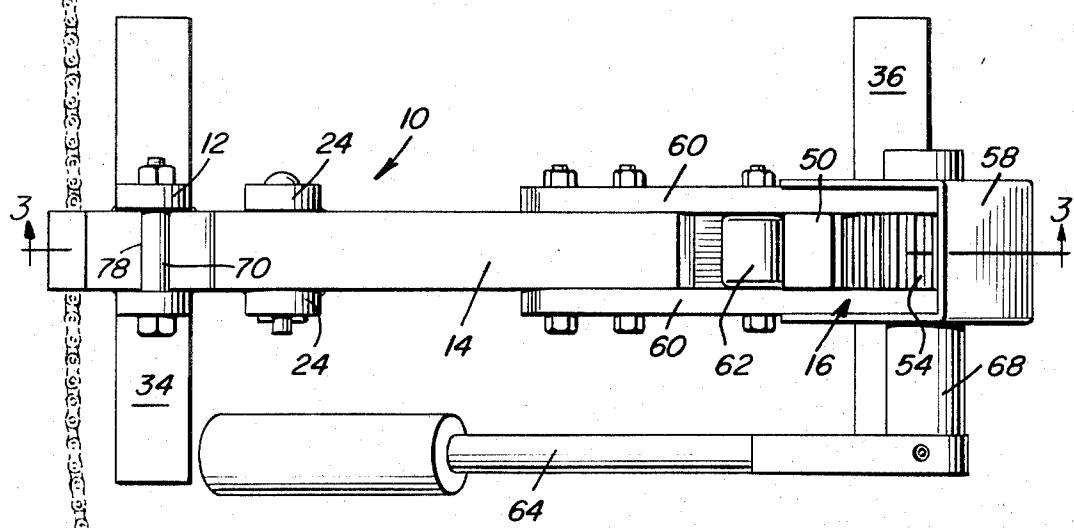


Fig. 2

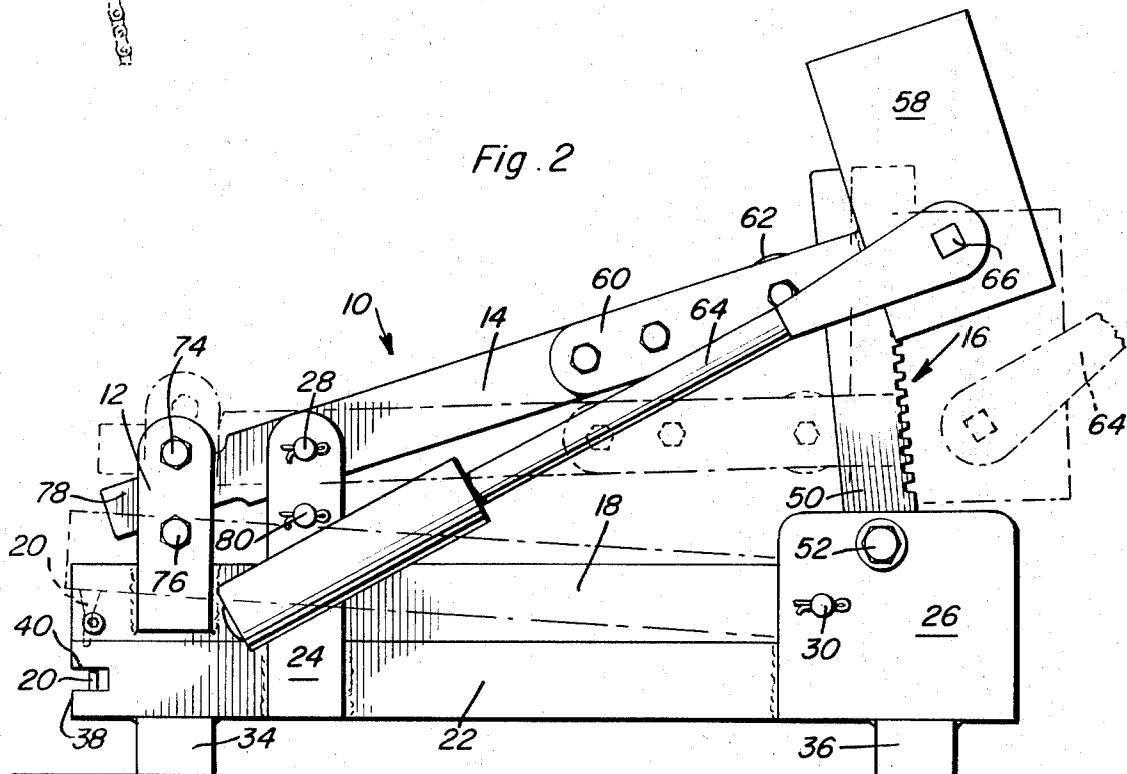
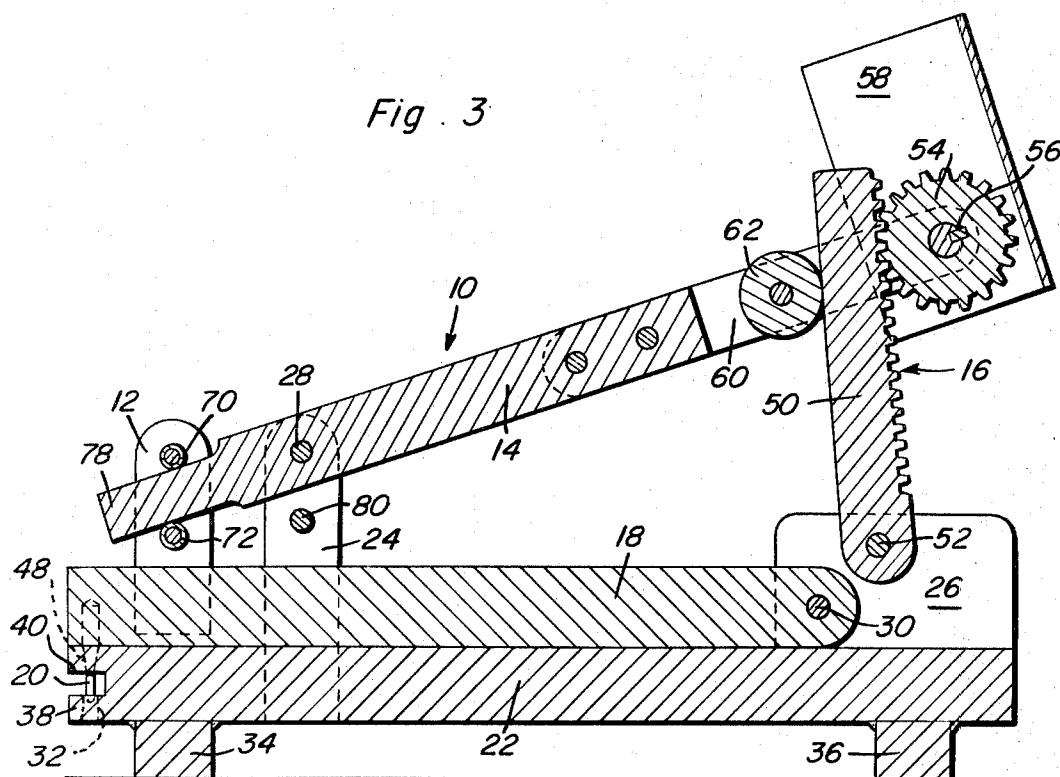


Fig. 3



## ROLLER CHAIN BREAKER

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates generally to punches, and in particular to such tools used for breaking roller chains and the like by punching pins therefrom.

## 2. Description of the Prior Art

The widespread use of roller chains and the like has created a need for special tools for breaking the chain by punching out one or more pins and removing or adding links to the chain to make it of a suitable length for a specific application.

Numerous devices have been proposed for breaking these chains. A typical arrangement employed by these devices features a clamp with a screwthreaded rod which advances against a roller chain pin to press it out of the bore of an associated link.

However, these known devices have proven unsatisfactory in that they frequently damage the roller link ends and ruin substantial amounts of chain. Further, the punch pins of these known devices tend to bend, resulting in high maintenance cost and substantial equipment downtime.

Another problem encountered with these known devices is that they are slow in operation, a distinct disadvantage in this way of high labor costs.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a roller chain breaker which features a fast, positive action for cleanly and quickly knocking pins from roller chain.

It is another object of the present invention to provide a punching tool which not only will handle various sizes of standard roller chain, but may be adapted to perform other appropriate punching operations as well.

These and other objects are achieved according to the present invention by providing a tool having a pivotally mounted lever connected to a member for moving same, and an arrangement for selectively pivoting the lever. A pivotally mounted link is connected to the member for movement therewith, and is provided with at least one punch. The lever and link are pivotally mounted to a base member which is provided with a die for cooperating with the punch on a movement of the link toward a workpiece.

According to a preferred embodiment of the present invention particularly suited for punching pins from roller chain and the like, the base member has a side surface provided with a recess communicating with the die and arranged for holding a workpiece such as a length of roller chain. The base member is further provided with an opening communicating with the recess and arranged for permitting the passage of the punch into the recess.

Accordingly, a roller chain breaker according to the present invention has a plurality of punches, openings, and dies for simultaneously punching a plurality of chain pins so as to remove an entire link from the chain.

The pivoting arrangement preferably has a pivotally mounted rack and a gear rotatably mounted on the lever and arranged for engaging the rack so as to function as a pinion. The rack may be pivotally mounted on

the base member and be held in engagement with the gear by a guiding element. The pivotal mounting of the rack permits it to follow the gear as it is swung through a slight arc in pivoting the lever. The other end of the lever may be arranged between a pair of spaced guide elements provided on the member for sliding movement with respect to the member as same is swung through a slight arc by the pivoting of the lever. A handle is advantageously attached to a shaft upon which the gear is mounted for rotating the gear and pivoting the lever by the movement of the gear along the rack.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing a tool according to the present invention.

FIG. 2 is a side elevational view showing the tool of FIG. 1.

FIG. 3 is a vertical, longitudinal sectional view taken generally along the line 3-3 of FIG. 1.

FIG. 4 is an end elevational view looking from the left to the right of FIGS. 1 to 3 and showing the tool of those figures.

FIG. 5 is a fragmentary, sectional view showing a detail of the tool illustrated in FIG. 3.

FIG. 6 is a sectional view taken generally along the line 6-6 of FIG. 5.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more specifically to the drawings, FIGS. 1 to 4 show a punching tool 10 according to the present invention which has a member 12, and a pivotally mounted lever 14 connected to member 12 for moving same. Tool 10 also has an arrangement 16 for selectively pivoting lever 14. The details of a preferred embodiment of this arrangement will be discussed below. Tool 10 also has a pivotally mounted link 18 connected to member 12 for movement thereby. This link 18 is provided with at least one punch 20, the purpose of which will be discussed below.

A base member 22 pivotally mounts lever 14 and link 18 in a conventional manner, as by brackets 24, 26, respectively, and pins 28, 30. A die 32 (FIG. 3) is provided in base member 22 and arranged for cooperating with punch 20 by a movement of link 18 toward a workpiece. A pair of longitudinally extending supports 34, 36 are illustrated as supporting base member 22. However, any suitable arrangement for supporting tool 10 may be employed.

Base member 22 has a side surface, specifically end surface 38, provided with a recess 40 communicating with die 32 and arranged to hold a workpiece. Base member 22 is further provided with an opening 42 communicating with recess 40 and arranged for permitting the passage of punch 20 into recess 40.

Referring now to FIG. 5 of the drawings, a roller chain 44 is shown arranged in recess 40, and punch 20 is shown knocking a pin 46 of chain 44 out of the bore of its associated link. FIG. 6 of the drawings shows a preferred embodiment of a tool 10 according to the

present invention in which there are a plurality of punches 20, openings 42, and dies 32 for simultaneously knocking out a plurality of pins 46. Punches 22 are advantageously retained in lever 18 as by setscrews 48 arranged in threaded bores 49. Such an arrangement permits punches 20 of varying sizes and number to be arranged in lever 18.

Referring again to FIGS. 1 to 4 of the drawings, arrangement 16 has a rack 50 pivotally mounted to bracket 26 as by a pin 52. A gear 54 is rotatably mounted in a known manner on lever 14 and arranged for engaging rack 50 so as to function as a pinion. A pin 56 may serve as a shaft for gear 54. A shield 58 is also mounted on pin 56 so as to follow gear 54 along rack 50 and protect personnel in the vicinity of tool 10 from possible injury. Further, shield 58 serves to protect gear 54 and rack 50 from jamming from debris and the like falling therein. A pair of brackets 60 are rotatably mounted to pin 56 and are connected to lever 14 so as to connect lever 14 to gear 54. A, for example, roller guide 62 is arranged between brackets 60 for holding rack 50 in engagement with gear 54 at any position of gear 54 on rack 50. By proper design, the spacing of pin 28 from pin 56 will permit pivotally mounted rack 50 to follow gear 54 through a slight arc gear 54 will travel as it pivots lever 14 about pin 28. Arrangement 16 further includes a handle 64 connected to pin 56 as by, for example, rectangular end portion 66 thereon. Handle 64 may be selectively rotated for pivoting lever 14 by movement of gear 54 along rack 50. A sleeve 68 may be provided between handle 64 and shield 58 as is conventional in similar mechanical constructions.

A pair of spaced guide elements 70, 72 are advantageously mounted on member 12 as by pins 74, 76, for permitting an end portion 78 of lever 14 to be slidably connected to member 12. As can be best seen in FIG. 3 of the drawings, portion 78 is slidably arranged between elements 70, 72. Further, a pin 80 may be arranged between brackets 24, 26 for limiting the upward movement of link 18.

The operation of the tool 10 according to the present invention may readily be appreciated from the above description. A, for example, ASA No. 25  $\frac{1}{4}$  inch pitch, roller chain may be inserted into recess 40 in the manner illustrated in FIGS. 5 and 6 of the drawings. With handle 64, lever 14, and link 18 in the broken line positions as illustrated in FIG. 2 of the drawings, handle 64 may now be rotated counterclockwise as viewed in FIG. 2 so as to cause gear 54 to travel upwardly along rack 50. This movement of handle 64 will move lever 14 and link 18 into the full line positions as shown in FIG. 2. As link 18 moves from its broken line to full line position of FIG. 2, punch 20 will be passed downwardly through opening 42 and into recess 40. As punch 20 moves into recess 40, it will engage a pin 46 matched therewith and knock same out of the bore of the associated link of chain 44. It is understood that this same punching action may be used to perform other punching arrangements by a simple modification of die 32 in recess 40. The size of roller chain which may be handled by a tool 10 according to the present invention may be varied simply by providing a die (not shown) which has a plurality of sets of openings. Further, bores may be provided in link 18 for receiving a plurality of matching sets of punches 10 which may be simply inserted and removed by manipulation of setscrews 48. Reverse procedure before repeating.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A tool, comprising, in combination:
  - a. a base member
  - b. a member
  - c. a lever pivotally mounted on said base member and connected to said member for moving same; and
  - d. means for selectively pivoting said lever and including a rack pivotally mounted on said base member and a gear rotatably mounted on said lever and arranged for engaging said rack and functioning as a pinion.
2. A structure as defined in claim 1, further including a link pivotally mounted on said base member and connected to said member for movement thereby.
3. A structure as defined in claim 2, wherein said link is provided with at least one punch.
4. A structure as defined in claim 3, wherein the base member is provided with die means for cooperating with said punch on a movement of said link toward a workpiece.
5. A structure as defined in claim 4, wherein said base member has a side surface and is further provided with a recess in said side surface, said recess communicating with said die means and arranged for holding a workpiece.
6. A structure as defined in claim 5, wherein said base member is further provided with an opening communicating with said recess and arranged for permitting the passage of said punch into said recess.
7. A structure as defined in claim 6, wherein said recess is arranged for placement of a roller chain therein with a pin of the chain aligned with said die means and said opening for being punched out by said punch and breaking the chain.
8. A structure as defined in claim 6, wherein there are a plurality of punches, openings, and die means for simultaneously punching a plurality of chain pins.
9. A tool, comprising, in combination:
  - a. a member;
  - b. a pivotally mounted lever connected to said member for moving same;
  - c. means for selectively pivoting said lever, the pivoting means including a pivotally mounted rack and a gear rotatably mounted on said lever and arranged for engaging said rack and functioning as a pinion;
  - d. a pivotally mounted link connected to said member for movement thereby, said link being provided with at least one punch; and
  - e. a base member pivotally mounting said lever, rack and link, and provided with die means for cooperating with said punch on a movement of said link toward a workpiece, said base member having a side surface and being further provided with a recess in said side surface, said recess communicating with said die means and arranged for holding a workpiece, said base member being further provided with an opening communicating with said recess and arranged for permitting the passage of said

punch into said recess, said recess being arranged for placement of a roller chain therein with a pin of the chain aligned with said die means and said opening for being punched out by said punch and breaking the chain, there being a plurality of 5 punches, openings, and die means for simultaneously punching a plurality of chain pins.

10. A structure as defined in claim 9, wherein said pivoting means further includes means for holding said rack in engagement with said gear.

11. A structure as defined in claim 9, wherein said member is provided with a pair of spaced guide elements, and the lever is slidably arranged between said guide elements.

12. A structure as defined in claim 11, wherein the 15 pivoting means further includes a handle connected to said gear for selectively rotating same and pivoting said lever by movement of said gear along said rack.

13. A structure as defined in claim 9, wherein the pivoting means further includes a handle connected to 20 said gear for selectively rotating same and pivoting said lever by movement of said gear along said rack.

14. A tool, comprising, in combination:

- a. a base member
- b. a member

c. a lever pivotally mounted on said base member and connected to said member for moving same; and  
d. means including a pivotally mounted rack and a rotatably mounted pinion engaging the rack, a selected one of the rack and pinion being mounted on the lever, and the other of said rack and pinion being mounted on the base member, for selectively pivoting said lever upon rotation of the pinion.

15. A structure as defined in claim 1, wherein said 10 pivoting means further includes means for holding said rack in engagement with said gear.

16. A structure as defined in claim 15, wherein said member is provided with a pair of spaced guide elements, and the lever is slidably arranged between said guide elements.

17. A structure as defined in claim 1, wherein the pivoting means further includes a handle connected to said gear for selectively rotating same and pivoting said lever by movement of said gear along said rack.

18. A structure as defined in claim 1, wherein said member is provided with a pair of spaced guide elements, and the lever is slidably arranged between said guide elements.