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M. BERG

2,250,290

POCKET TOOL

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Fig. 1.

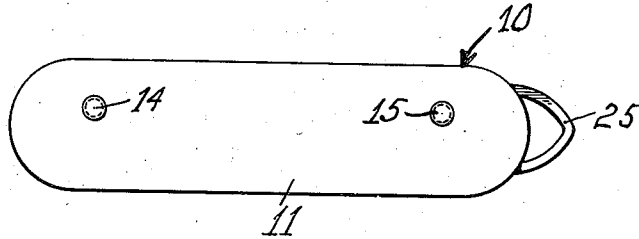


Fig. 2.

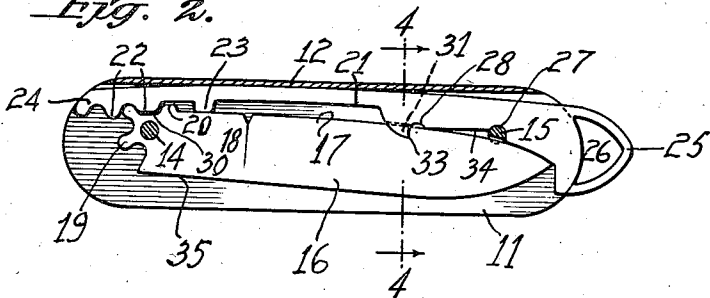


Fig. 3.

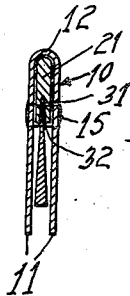
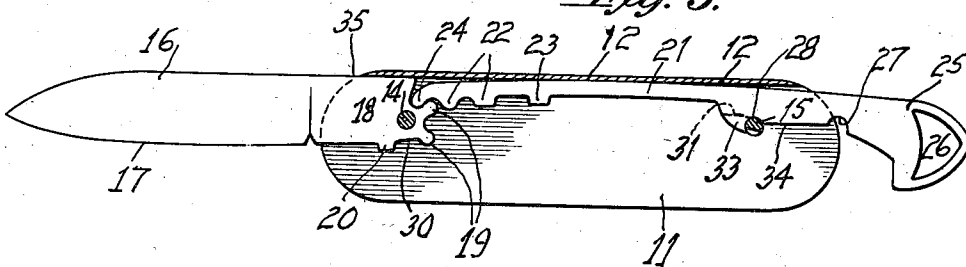


Fig. 4.

INVENTOR.

MARTIN BERG

BY

Sam A. Renschel

ATTORNEY.

UNITED STATES PATENT OFFICE

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POCKET TOOL

Martin Berg, New York, N. Y.

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8 Claims. (Cl. 30-158)

This invention relates to pocket tools and particularly to one in which the tool is pivotally opened and closed in a sheath-handle by a longitudinally sliding rack. Patent 1,647,405 to Giesen illustrates a pocket knife of such general construction. The prior tools of this type contained an undue number of parts, resulting in relatively expensive and complicated construction besides having accompanying imperfections in operation and lack of dependability.

The primary object of my present invention is to provide a pocket tool involving substantially an irreducible number of parts with resulting inexpensiveness, compactness, ease of operation, and dependability. I accomplish these objects by first forming suitable material into a trough-like or folded handle or frame preferably having a closed back with at least one open end and an open side, near each end of which is fixed a pin or rivet which acts to strengthen the handle and hold side portions spaced apart. On one pin is pivoted the tool and behind the other pin is arranged a rack member having teeth engaged with corresponding teeth on the shoulder of the tool, so as to slide back and forth in guided movements against the inside of the back of the handle. The rack may extend integrally beyond that end of the handle opposite the tool pivot, whereby, upon pulling out the rack, the tool is projected in open position, and upon pushing in the rack the tool is projected into closed position. The rack member is so formed as to give it some resiliency in the handle to prevent rattling of the parts in all positions without interposing undue resistance to sliding the rack, as well as to act to snap a holding part on the rack into a cooperating part on the handle to resiliently lock the tool in the open and closed positions.

My present invention is applicable to all types of pocket tools having a sheath-handle and is useful for a knife, file, comb, razor, household cutlery and the like. The following description of the invention is of a preferred embodiment applied to a pocket knife construction as illustrated in the drawing, in which:

Fig. 1 is a side view of the pocket knife with the blade in closed position; Fig. 2 is a cross-sectional view through the pocket knife with the blade in closed position; Fig. 3 is a similar cross-sectional view of the blade extended in the open position; and Fig. 4 is a cross-sectional view through the knife taken along the line 4-4 of Fig. 2.

The sheath-handle 10 may be made of suitable material, bent, molded or pressed to finished form

in a single piece. It is preferably of a metal plate, as sheet steel or brass, stamped out and bent to the folded form. However, plastic or other molded material may be used. Sheath 10 has flat side portions 11 connected by an integral slightly rounded back portion 12. Rivets 14 and 15 grip side portions 11 together and act to strengthen the sheath-handle rigidly holding the side portions in suitable spaced relation. The tool blade 16 has a cutting edge 17 and a shoulder 18 which is pivoted on pin 14 so as to turn freely thereon from its closed position of Fig. 2 to its open position of Fig. 3. Along the bottom and outer sides of shoulder 18 are teeth or projections 19 and 20.

A rack member 21 of metal has teeth or projections 22 and 23 and tip 24 engageable with corresponding teeth or projections 19, 20 of the blade. Member 21 slides against back portion 12 of handle 10 behind pin 15 and is guided therein for a push and pull movement. Member 21 has an integral extension 25 projecting in closed position (Fig. 2) beyond the end of handle 10 opposite to that of blade pivot 14. End 25 has a cutout at 26 suitable for gripping to operate it, as well as for attaching a key ring, chain or the like. Rack member 21 is preferably stamped out of sheet metal sufficiently thick for forming suitable teeth and projections 22, 23 and having sufficient resiliency for its operation as hereinafter described.

Member 21 has two grooves or stops 27 and 28 which engage pin 15 when the blade is in the closed and open positions, respectively. Member 21 is slightly cambered or has other suitable means coacting with the inside of the back portion 12 of the handle to give the member a degree of resiliency to prevent it and the blade from rattling in any position, as well as to snap the grooves 27 and 28 around pin 15 to resiliently lock blade 16 in open or closed position. The degree of resiliency is such as to permit an easy sliding movement of the rack and a ready disengagement of the grooves 27 and 28 from pin 15 in opening and shutting the knife.

The sheath-handle 10 is preferably formed of a folded-over sheet in a U-form as already described. The side portions 11-11 of sheath 10 are preferably slightly biased outwardly to insure suitable cooperation with the rivets or pins 14, 15. The resilient rack member 21 is cambered or bowed at the intermediate portion thereof and is sprung between the rack section containing teeth and projection 22, 23 and the opposite end which contains the notches 27, 28 cooperating

with pin 15. The back of the intermediate portion of member 21 slides against back portion 12 of the sheath. The unitary rack member 21 insures simplicity of construction with a minimum number of parts and assembly factors for the knife, rendering it foolproof and inexpensive. The cambered or spring arrangement of member 21 insures a firm snap action in swinging the tool or blade 16 between its open and closed positions as well as maintains the assembly in stable arrangement, as will be evident hereinafter.

Figs. 2 and 4 illustrate the blade 16 in its closed position. Rack member 21 is in its innermost position, wherein its teeth 22 coact with teeth 19 of the blade to maintain it closed. Projection 23 of the rack abuts an edge of blade shoulder 18 to limit its inward movement. The cambered, slightly convexed, or otherwise resiliently bowed rack member 21 continuously biases teeth 22 against blade teeth 19 to stably maintain it in its closed position. It will be noted that rack teeth 22 press against the blade teeth 19 and present a force resolved beyond the pivot pin 14 to keep it in this position preventing any incidental movement or jarring thereof. The opposite end 27, 28 of member 21 presses against pin 15. The resilient action of member 21 prevents slight movements or variations in the position of the blade when closed or open, and locks it in these positions through 27, 28.

Central longitudinal slots 31 and 32 are provided in the projecting tooth 33 of member 21 adjacent groove 23 and in pin 15 respectively. Thus edge 17 of the blade which projects furthest into the handle 10 is accommodated without contacting these components of the structure. The projecting end 25 of member 21 is made sufficiently large to permit ready manual gripping thereof for the push and pull action on the blade.

To effect the opening of the knife blade, projecting end 25 is pulled outwardly, raising groove 27 of member 21 from engagement with pin 15. As member 21 is pulled outwardly, surface portion 34 of member 21 is slid along the back portion of pin 15 until notch 28 reaches over pin 15. Projecting tooth 33 limits the outward excursion of member 21 when it abuts pin 15, as will now be evident. The pulling action on member 21 overcomes the stably resilient formation of closed position. Rack teeth 22 cooperate with blade teeth 19 to swing the blade clockwise to extend it to the open position as shown in Fig. 3. The tip 24 of member 21 forms a tooth cooperating with the last tooth 19 of blade 16 to stably maintain the blade in its open position. The resilient stabilizing action of cambered member 21 remains effective due to the continued bowing thereof between pin 15, back portion 12, and blade tooth 19. The rear surface 35 of shoulder 18 of the blade abuts the back sheath portion 12, limiting the swinging of the blade during its extension. Spring-pressed tip 24 of member 21 now continually biases the blade into the open or clockwise direction by its action on tooth 19 of the blade, as will now be evident.

The pocket tool of my present invention is formed of essentially five elements, mutually coacting to constitute a simple, stable and foolproof structure. The tool or blade is rendered extremely firm and stable in either opened or closed position. The possibility of rattling or loosening of any of the component parts is greatly minimized due to the continuous spring-biasing action by the unitary cambered rack member 21. 75

Member 21 is firmly fixed in position between the pin 15, the blade at teeth 19 as well as the back portion 12 of handle 10. Manual movement of the projecting end 25 thereof effects the longitudinal shifting of member 21 between its inward and outward positions as defined by notches 27 and 28 with respect to pin 15. This sliding action of rack member 21 effects the swinging of the tool to its positions inside or outside of the sheath-handle.

The cambered member 21 is shown sprung against back portion 12 of sheath-handle 10. Naturally a separate back stop and guide for member 21 for its sliding action may be used. Such a back stop may well constitute a partition piece within the sheath, particularly where more than one tool element is incorporated in the structure. I therefore use the term "back portion" in the specification and claims as generic to such back stop or portion lying between or otherwise joining with the two sides of the sheath-handle.

Although I have specifically described and illustrated my invention in connection with a single-blade pocket knife, it is to be understood that the invention may be applied to multi-tool units in general where more than one tool section is used. Each tool may have an independent manually actuatable member corresponding to member 21 of the illustrated form. The back stop corresponding to portion 12 of handle 10 may be intermediate between the edges of the sides 11. Likewise, disclosed pins 14 and 15 may be replaced by equivalent mechanical expedients performing the respective functions of pivoting the tool 16 and coacting with rack section 34 and notches 27, 28. Furthermore, the tool element may be of any desired form such as a file, comb, surgical instrument and the like. I am aware that the modifications falling within the broader spirit and scope of the invention are feasible and accordingly I do not intend to be limited except as set forth in the following claims.

Having thus described my invention what I claim is:

1. In a pocket tool, a one-piece handle having two side portions connected by a back portion to form a trough-like structure open at its front and at least one of its ends, pins connecting said side portions near the two ends of the handle, a tool member pivoted on one of said pins and having projections, and a rack member having projections engageable with the tool projections for turning the tool on its pivot, said rack member being longitudinally slidable along the inside of said back portion and in slidable contact with the second one of said pins for keeping the tool member in stable position, said rack member having longitudinally spaced notches arranged to be snapped about said second pin when moved to operate said tool in open and closed positions.

2. In a pocket tool, a frame comprising a handle having two side portions, a back portion between said side portions, and pin elements mounted on said side portions near the two ends thereof; a tool pivoted within said frame on one of said pin elements and carrying projections; and a rack member having projections engageable with said tool projections and being slidable along the inside of said back portion and in contact with the back of the second one of said pin elements, said member being arranged to cooperate with said back portion to resiliently hold it in sliding contact with the back of said second pin element and

also to hold said projections of the rack and tool member in firm engagement with each other, said rack member having two longitudinally spaced notches arranged to be snapped about said second pin element when moved to operate said tool into closed and open positions and maintain said tool stable in the positions and having an integral handle extending outside the frame for manually operating said tool into said positions.

3. In a pocket tool, a frame comprising a handle having two opposed sides, a back portion between said sides, and a pin element near each of the two ends thereof connecting said sides; a tool pivoted within said frame on one of said pin elements and carrying projections; and a rack member having projections engageable with the tool projections and being slidable along the inside of said back portion of the frame behind the second one of said pin elements, said rack having a camber cooperating with said back frame portion to resiliently hold it in sliding engagement with said second pin element and firmly hold its projections in engagement with said tool projections, and having an integral handle extending outside the frame for manually sliding said rack member and operating said tool.

4. In a pocket tool of the character described, a frame comprising two opposed sides resiliently biased apart, a back connecting with said sides, and a pin fixed near each end thereof holding said sides apart a predetermined distance; a tool pivoted on one of said pins and carrying projecting teeth near the pivoted portion thereof; and a member having projecting teeth near one end thereof engageable with the tool teeth and having two longitudinally spaced notches near the other end thereof selectively engageable with the second of said pins, the intermediate portion of said member being arranged to slide against said back frame portion to press the member teeth and notches respectively into firm cooperative relation with the tool teeth and second pin to maintain said tool stable when in open and closed positions.

5. In a pocket tool of the character described, a frame comprising two opposed sides, a back connecting with said sides, and a pin fixed near each end thereof holding said sides apart a predetermined distance; a tool pivoted on one of said pins and carrying projecting teeth near one end thereof; and a member having projecting teeth near one end thereof engageable with the tool teeth and having two longitudinally spaced notches near the other end thereof selectively engageable with the second of said pins, the intermediate portion of said member being resilient and bowed towards said back frame portion and arranged to slide against said back portion to press the mem-

ber teeth and notches respectively into firm cooperative relation with the tool teeth and second pin to maintain said tool stable when in open and closed positions, a section of said member projecting beyond said second pin and outside the corresponding frame end arranged for manual gripping for longitudinally sliding the member to snap either of the notches thereof about said second pin to correspondingly operate the tool in its open and closed positions.

6. In a pocket tool of the character described; a frame comprising a back portion, pivotal means mounted near one end of said frame, and a projection near the other end thereof; a tool pivoted on said pivotal means and carrying projecting teeth near the pivoted portion thereof; and a member having projecting teeth engageable with the tool teeth and having spaced notches selectively engageable with the frame projection, a portion of said member being arranged to slide against said frame back portion and to press the member teeth and notches respectively into firm cooperative relation with the tool teeth and the frame projection to maintain said tool stable in its open and closed positions.

7. In a pocket tool; a frame comprising a handle having two opposed sides and a portion arranged between said sides; pivotal means near one end of said frame and a projection near the other end thereof; a tool pivoted on said pivotal means and carrying toothed projections; and a rack member having toothed projections engageable with the tool toothed projections and being slidable between the frame portion and the frame projection, said rack member having a resiliently cambered section cooperating with said frame portion to resiliently press said member against said frame projection and said member projections into firm engagement with said tool projections, said rack member having two longitudinally spaced notches arranged to be selectively snapped about said frame projection when moved to operate said tool into its closed and open positions and maintain the tool stable in said positions.

8. In a pocket tool of the character described; a frame comprising a back portion, pivotal means mounted near one end of said frame, and a projection near the other end thereof; a tool pivoted on said pivotal means and carrying projecting teeth near the pivoted portion thereof; and a member having projecting teeth engageable with the tool teeth, spaced notches selectively engageable with the frame projection, and an integral handle having an opening extending outside the frame opposite the end at which said tool is pivoted.

MARTIN BERG.