July 11, 1961 M. L. WUISCHPARD 2,991,545

MANUAL GRIPPING TOOL

Filed March 19, 1959

FIG. 1

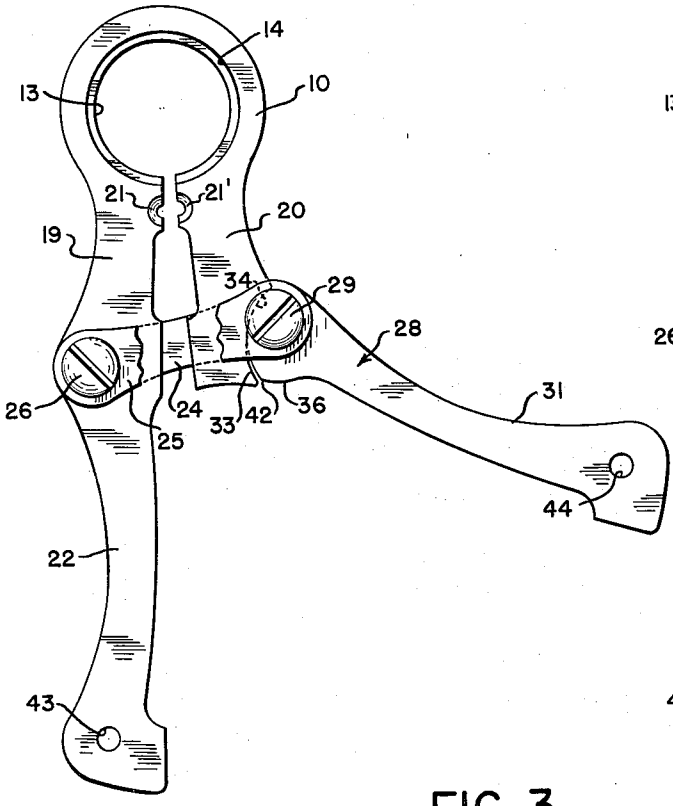


FIG. 2

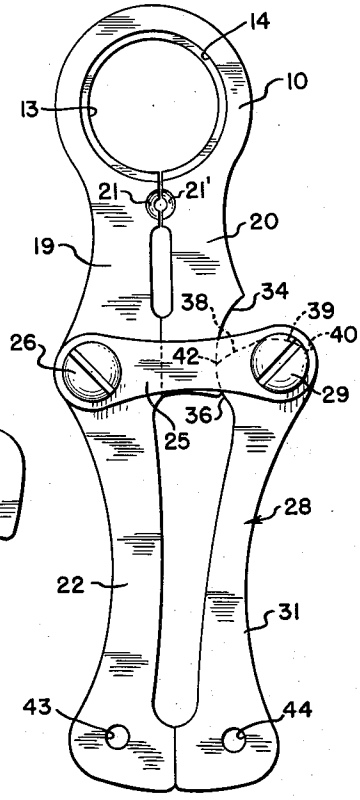


FIG. 3

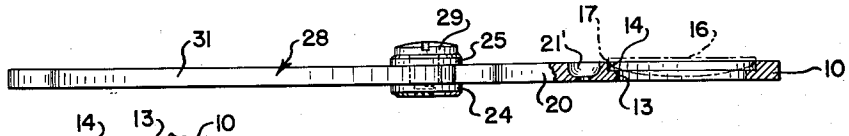
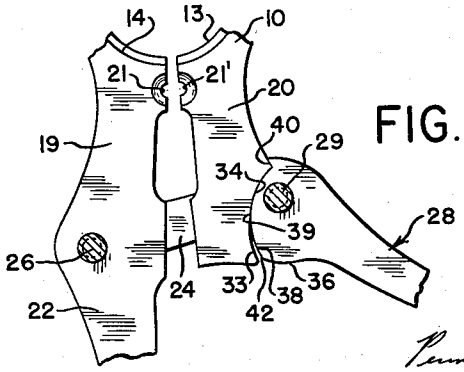


FIG. 4



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MANUAL GRIPPING TOOL

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This invention relates to hand tools for gripping objects about their periphery and, more particularly, to a manually operated gripping tool having a clamping member which can be closed tightly about the periphery of an object and locked so that the object can be held in the tool. The tool provided by the invention is especially suitable for inserting and removing resilent circular watch crystals from watch casings, since the crystals need only be gripped once for both removal and replacement without being released from the tool.

Watch crystals of resilient plastic material are often of circular substantially concavo-convex shape. Such crystals are normally mounted on a watch with the convex surface of the crystal facing outwardly and are secured by means of a small annular shoulder encircling their periphery which is adapted to fit under a corresponding small flange on the casing of the watch.

One of the most suitable methods of assembling such a crystal to a watch casing is to compress the crystal radially substantially completely around its periphery so that its diameter is reduced enough to permit its shoulder to fit under the flange. This method has been carried out heretofore by a tool of elementary design which includes a split ring adapted to fit around the crystal and a simple clamping lever for squeezing the ring and crystal radially. It is the purpose of the present invention to improve upon devices of this type.

The invention therefore provides a new and improved hand tool for gripping an object about its periphery. The tool comprises a substantially C-shaped clamping member of resilent material which includes a pair of normally spaced first and second opposed end portions. This clamping member is adapted to be disposed about the object and to be closed tightly against the periphery thereof when the first and second end portions are moved together. The tool also includes an arm extending rigidly from the first end portion and a lever opposed to the arm. The lever is pivotally mounted a fixed distance from a point on the arm for selective manual displacement relative thereto. Cam means on the lever in engagement with the second end portion are adapted to move the second end portion toward the first end portion when the lever is displaced on its pivotal mounting toward the arm. In this manner the clamping member is closed about the object. Locking means are also included for holding the lever substantially at its closest position adjacent the arm.

When this new tool is used to remove a circular watch crystal of resilient material from a watch casing, it is only necessary to position the C-shaped clamping member about the crystal and to squeeze the lever toward the arm. As this is done, the crystal is engaged almost completely around its periphery by the inner surface of the clamping member and is radially compressed so that the shoulder on the crystal is snapped into or released from the flange on the watch casing. When the lever is displaced substantially to its closest position adjacent the arm, the above-mentioned locking means holds the tool in that position so that the operator may release his grip on the tool without dropping the crystal from the clamping member. Thus, the tool may be set aside while work is being done on the watch and, upon completion of the work, the crystal may be quickly re-inserted in the watch casing.

A preferred embodiment of the invention is described hereinbelow with reference to the accompanying drawing, wherein

FIG. 1 is a plan view partly broken away of the new tool of the invention showing the clamping member in open position;

FIG. 2 is a plan view of the new tool with the clamping member locked in closed position;

FIG. 3 is a side elevation partly in section of the tool in its closed position showing a watch crystal secured in the clamping member; and

FIG. 4 is a fragmentary plan view in section of the means for closing the clamping member and locking it in its closed position.

Referring first to FIGS. 1–3, the tool includes a resilient clamping member 10, of spring steel or the like, which is in the shape of a substantially circular split ring. As seen in FIG. 3, the clamping member 10 has inner shoulders 13 and 14 of different diameters so that the tool may be used to grip watch crystals of two different sizes.

When the split clamping member 10 is spread apart to the open position shown in FIG. 1, the clamping member can be easily disposed about a circular watch crystal 16, as indicated in dotted lines in FIG. 3. Then, when the clamping member 10 is squeezed closed to the position shown in FIG. 2, it assumes a substantially circular shape and tightly encircles the periphery of the crystal 16. At the same time, the crystal is compressed radially such that a small shoulder 17 formed about its periphery is reduced in diameter to clear the flange on the watch casing.

Included in the clamping member 10 are integral first and second end portions 19 and 20 extending from each side of the split in the clamping member. These end portions 19 and 20 are opposed to one another and are normally spaced apart in side-by-side relationship so that the clamping member 10 may be opened and closed by displacing the end portions 19 and 20 away from or toward one another. Additional opposed gripping surfaces may be formed in the adjacent edges of the end portions 19 and 20 to grasp objects other than watch crystals. (For example, corresponding halves 21 and 21′ of a bore of substantially countersunk shape may be formed in the end portions 19 and 20 respectively to grip and remove a crown from the stem of a watch.) Hence, either the circular clamping member 10 or its pair of end portions 19 and 20 may be used as gripping means.

The end portion 19 of the clamping member 10 has an integral arm 22 extending rigidly therefrom to serve as one of a pair of manual actuators. Mounted on the arm 22 are a pair of linking members 24 and 25 which are pivotally attached to opposite sides of the arm by a rivet or screw 26, or similar fastener. The opposite ends of the linking members 24 and 25, remote from the screw 26, are pivotally attached by means of a second screw 29 to the end of a lever 28. The lever 28 has a handle portion 31 which is opposed to the arm 22 and is suitably shaped to be gripped in the hand of the operator.

Thus, the lever 28 is mounted for selective manual displacement relative to the arm 22. Also, the lever is in slidable engagement with the second end portion 20 of the clamping member 10. There are two surfaces on the end portion 20 which come in contact with lever 28 during displacement of the lever, namely the separate arcuate surfaces 33 and 34. These arcuate surfaces are adapted to engage cam means on the lever 28, namely the arcuate surfaces 36, 38 and 39. The surfaces 33 and 36 are advantageously of equal radius, as are the surfaces 34 and 39.

In displacing the lever 28 from the position shown in

FIG. 1 toward the arm 22 to the position shown in FIG. 2, the sliding action between the above-mentioned surfaces is as follows: The resiliency of the clamping member 10 forces the end portions 19 and 20 apart and urges the surface 34 on the end portion 20 tightly against the corresponding surface 39 on the lever 28. A small shoulder 40, seen in FIG. 4, at one end of the surface 39 prevents the lever 28 from being displaced about its pivotal mounting further away from the arm 22 than the position shown in FIG. 1. As the operator squeezes the handle portion 31 of the lever toward the arm 22, the lever 28 begins to pivot about a ridge 42 defined between the surfaces 36 and 38. At the beginning of this pivoting action, the ridge 42 rests upon the outer end of the surface 33 on the end portion 20.

By further turning the lever 28 on its pivotal mounting, the ridge 42 on the lever slides away from the outer end of the surface 33 and, at the same time, forces the end portion 20 toward the end portion 19 to close the clamping member 10. The surface 36 on the lever 28 is then turned into face-to-face engagement with the surface 33 on the end portion 20. When the surface 36 is in full face-to-face engagement with the surface 33, the clamping member 10 has reached its closed position. Further movement of the lever 28 toward the arm 22 advances the ridge 42 toward the center-line of the linking members 24 and 25 and, when it crosses that line (in the position shown in FIG. 2), the turning force exerted by the end portion 20 on the lever 28 changes direction and commences to urge the lever 28 toward the arm 22 rather than away from it.

With the handle portion 31 of the lever 28 displaced fully to its closest position adjacent the arm 22, the clamping member 10 is still in its completely closed position. There may, however, be a silght gap between the end portions 19 and 20 to insure that they are not forced together in metal-to-metal contact. This closed position of the tool is quite stable because to open the clamping member 10 the lever 28 must be displaced away from the arm 22 a sufficient distance to carry the ridge 42 on the lever 28 back across the center-line of the linking members 24 and 25. Since this will not ordinarily happen inadvertently, the tool may be set aside in closed position with full assurance that it will not accidentally open to release the watch crystal from the clamping member. Holes 43 and 44, in the free ends of the arm 22 and lever 28 respectively, are provided for hanging the tool in either its open or closed position when it is set aside.

I claim:

1. In a selectively releasable hand tool having first and second actuating end portions which are movable substantially laterally toward one another against a spring force from a spaced position wherein the tool is sprung open to a relatively close position wherein the tool is forced closed, closing and locking means for said end portions comprising an arm extending rigidly from said first end portion, a lever pivotally mounted a fixed distance from a point on said arm for selective substantially pivotal displacement relative to said arm, said second end portion extending between the pivot of said lever and said arm and urging said pivot away from said arm, first and second cams on said second end portion and lever, said first cam comprising two adjoining arcuate surfaces and a ridge defined therebetween, one of said surfaces contacting said second cam when the lever is remote from said arm and the tool is sprung open and the other of said surfaces contacting said second cam when the lever is adjacent said arm and the tool is forced closed, said ridge being on opposite sides of the line of force exerted at the pivot of said lever by said second end portion when said tool is open and closed, whereby said tool is self-maintained over dead center in open and closed position.

2. The combination according to claim 1 wherein said hand tool is adapted to grip an object about its periphery and comprises a substantially C-shaped clamping member of resilient material, said first and second end portions extending rigidly from the opposite ends of said C-shaped clamping member.

3. The combination according to claim 2 wherein said hand tool is adapted to grip a resilient circular object about its periphery and wherein said C-shaped clamping member includes a substantially circular split-ring portion of resilient material, the diameter of the inner surface of said split-ring portion being substantially equal to that of said object when said clamping member is substantially closed .

4. The combination according to claim 3 wherein said split-ring portion of said clamping member is formed with inner circumferential shoulders of various diameters to accommodate resilient circular objects of various diameters.

5. In a selectively releasable hand tool having first and second actuating end portions which are movable substantially laterally toward one another against a spring force from a spaced position wherein the tool is sprung open to a relatively close position wherein the tool is forced closed, closing and locking means for said end portions comprising an arm extending rigidly from said first end portion, a linking member pivotally attached at one end to said arm adjacent said first end portion, a lever pivotally mounted to the other end of said linking member for selective substantially pivotal displacement relative to said arm, said second end portion extending between the pivot of said lever and said arm and urging said pivot away from said arm, first and second cams on said second end portion and lever, said first cam comprising two adjoining arcuate surfaces and a ridge defined therebetween, one of said surfaces contacting said second cam when the lever is remote from said arm and the tool is sprung open and the other of said surfaces contacting said second cam when the lever is adjacent said arm and the tool is forced closed, said ridge being on opposite sides of the line of force exerted at the pivot of said lever along the center line of said linking member by said second end portion when said tool is open and closed, whereby said tool is self-maintained over dead center in open and closed position.

6. The combination according to claim 5 wherein said hand tool is adapted to grip an object about its periphery and comprises a substantially C-shaped clamping member of resilient material said first and second end portions extending rigidly from the opposite ends of said C-shaped clamping member.

7. The combination according to claim 6 wherein said hand tool is adapted to grip a resilient circular object about its periphery and wherein said C-shaped clamping member includes a substantially circular split-ring portion of resilient material, the diameter of the inner surface of said split-ring portion being substantially equal to that of said object when said clamping member is substantially closed.

8. The combination according to claim 7 wherein said split-ring portion of said clamping member is formed with inner circumferential shoulders of various diameters to accommodate resilient circular objects of various diameters.

9. In a selectively releasable hand tool having first and second actuating end portions which are movable substantially laterally toward one another against a spring force from a spaced position wherein the tool is sprung open to a relatively close position wherein the tool is forced closed, closing and locking means for said end portions comprising an arm extending rigidly from said first end portion, a linking member pivotally attached at one end to said arm adjacent said first end portion, a lever pivotally mounted to the other end of said linking member for selective substantially pivotal displacement relative to said arm, said second end portion extending between the pivot of said lever and said arm and urging said pivot away from said arm, first and second

cams on said lever and second end portion respectively, said first cam comprising two adjoining concave surfaces and a ridge defined therebetween and said second cam comprising two adjoining convex surfaces, one of said concave surfaces seated in one of said convex surfaces when the lever is remote from said arm and the tool is sprung open and the other of said concave surfaces seated in the other of said convex surfaces when the lever is adjacent said arm and the tool is forced closed, said ridge being on opposite sides of the line of force exerted at the pivot of said lever along the center line of said linking member by said second end portion when said tool is open and closed, whereby said ridge slides over dead center when said lever is fully displaced so that said tool is self-maintained in open and closed position.

10. The combination according to claim 9 wherein said hand tool is adapted to grip an object about its periphery and comprises a substantially C-shaped clamping member of resilient material said first and second end portions extending rigidly from the opposite ends of said C-shaped clamping member.

11. The combination according to claim 10 wherein

said hand tool is adapted to grip a resilient circular object about its periphery and wherein said C-shaped clamping member includes a substantially circular split-ring portion of resilient material, the diameter of the inner surface of said split-ring portion being substantially equal to that of said object when said clamping member is substantially closed.

12. The combination according to claim 11 wherein said split-ring portion of said clamping member is formed with inner circumferential shoulders of various diameters to accommodate resilient circular objects of various diameters.

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