

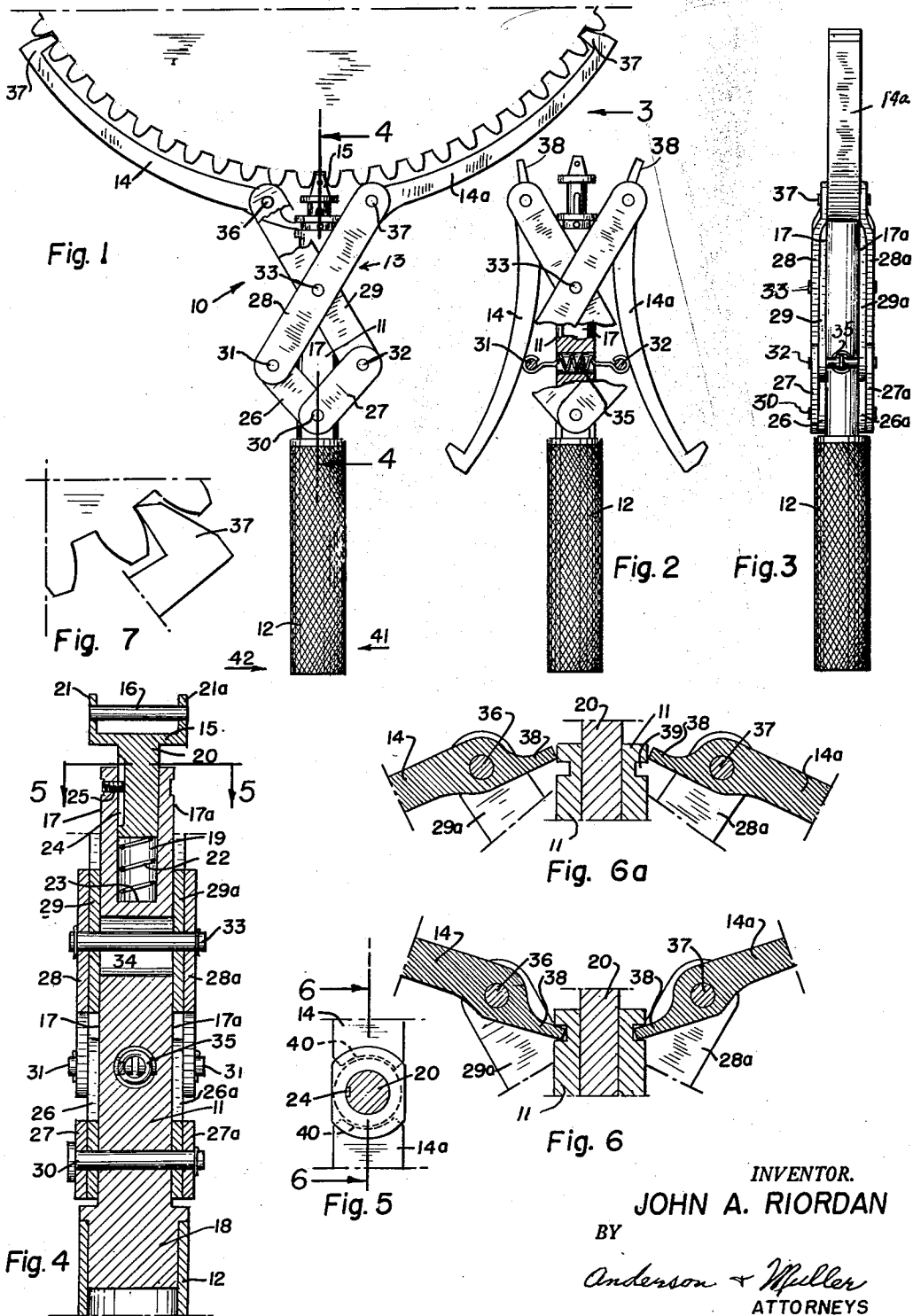
Oct. 21, 1952

J. A. RIORDAN

2,614,445

FLYWHEEL SPANNER WRENCH WITH TOOTH ENGAGING ABUTMENT

Filed Nov. 25, 1949



UNITED STATES PATENT OFFICE

2,614,445

FLYWHEEL SPANNER WRENCH WITH
TOOTH ENGAGING ABUTMENTJohn A. Riordan, Denver, Colo., assignor to
James T. Clark, Fort Morgan, Colo.

Application November 25, 1949, Serial No. 129,277

12 Claims. (Cl. 81-90)

1

This invention relates to improvements in devices for manually rotating engines and more particularly to a tool adapted to detachably engage the flywheel ring gear thereof.

In the assembly and disassembly or repair of engines, such as automobile engines, it becomes necessary to rotate the crankshaft to position various operative parts. If the flywheel is readily accessible, as it is on many types of engines, rotation of the crankshaft is effected by grasping the rim of the flywheel and turning it by hand. This is objectionable since the sharp edges of the teeth may cut the mechanic's hands, and in cases where the engine is unduly stiff owing to tight bearings, or other moving parts, there is often insufficient leverage available at the rim of the flywheel to rotate it.

The principal object of the invention is to provide a tool which may be readily attached and detached to the flywheel starter or ring gear to form a lever by which the flywheel may be rotated.

Another object is to provide the tool with sufficient adjustment so that it may be applied to ring gears of various diameters and/or various pitch of teeth thereon.

Another object is to provide a tool with which the flywheel may be rotated in either direction after it has been applied thereto.

Another object is to provide a tool which may be applied to or removed from the ring gear teeth by a radial movement relative to the flywheel.

Another object is to provide a tool in which certain parts thereof are foldable to reduce its bulk to thereby facilitate storage in the mechanic's tool kit.

Further objects are to provide a tool which is simple in construction, has wide versatility of use, may be economically manufactured, is rugged in construction, and efficient in operation.

Still further objects, advantages, and salient features will become more apparent from a consideration of the description to follow, the appended claims, and the accompanying drawing, in which:

Figure 1 is a side elevation of the tool which constitutes the subject of the invention shown attached to the conventional ring gear provided on a flywheel;

Figure 2 is a similar side elevation showing the tool in folded position;

Figure 3 is a side elevation as viewed in the direction of arrows 3, Figure 1;

Figure 4 is an enlarged longitudinal section taken on line 4-4, Figure 1;

2

Figure 5 is a section taken on line 5-5, Figure 4;

Figure 6 is a fragmentary section taken on line 6-6, Figure 5, showing the flywheel engaging arms in operative position;

Figure 6a is a similar section showing the arms in another position during the folding of same; and

Figure 7 is an enlarged detail of an end of one of the arms showing the manner in which it engages a tooth of the ring gear.

Referring in detail to the drawing, the tool 10 comprises, in general, an elongated shank member 11 having a handle 12 at one end thereof, a linkage system 13; operatively associated with the shank member, a pair of arms 14, 14a pivotally secured to upper ends of the linkage system, and a spring urged member 15 having a tooth engaging member 16 thereon.

Shank 11, as illustrated, is constructed from a round piece of bar stock which has flattened opposed sides 17, 17a, the lower end of the handle having a circular portion 18 which is pressed into, or otherwise secured to tubular handle 12, the outer surface of which is knurled to facilitate gripping thereof.

The upper end of the shank is provided with a circular blind hole 19 which telescopically receives a plunger 20, the upper end thereof carrying a pin 16 secured at its ends to upstanding flanges 21, 21a, this pin forming the tooth engaging member previously referred to. A spring 22 is disposed in hole 19, the lower end thereof abutting the lower surface 23 of the blind hole, and the upper end abutting the lower end of plunger 20 thus urging it upwardly. Plunger 20 is provided with a groove 24 in which is disposed the end of a screw 25, this screw serving to limit axial movement of the plunger in hole 19 and also preventing rotation thereof.

The linkage system comprises links 26, 27, 28 and 29 on one side of shank 11 and links 26a, 27a, 28a and 29a on the other side. Links 26 and 27 are pivoted at their lower ends to the shank by a pin 30 extending through the shank, one end of the pin forming a pivot for links 26, 27 and the other end forming a pivot for links 26a, 27a.

The upper ends of links 26, 26a are pivotally connected to the lower ends of links 28, 28a, respectively, by a pin 31. Similarly, links 27, 27a and links 29, 29a are pivotally connected by a pin 32. Links 28, 29 and links 28a, 29a, respectively, cross intermediate their ends and a pin 33 extends between the links on opposite sides of the shank, this pin sliding in a slot 34 in

the shank. A tension spring 35 extends between pins 31 and 32 urging them toward each other.

Arm 14 is pivotally secured near its inner end to links 29, 29a by a pin 36, and arm 14a is similarly secured to links 28, 28a. It will now become apparent that as links 28, 29 and 28a, 29a are moved upwardly or downwardly, pin 33 will move rectilinearly in its guide slot 34 and pins 36, 37 will move in such manner that at any point of adjustment, links 28, 28a will be in the same relative position to the axis of the shank as the corresponding links 29, 29a. For example, as pins 36, 37 move downwardly and outwardly these pins will be in the same plane perpendicular to the axis of the shank and also the same distance from such axis.

Arms 14, 14a are identical and each is curved substantially as shown, the outer ends each having a hooked jaw 37 which engages a ring gear tooth at the root thereof as shown in Figure 7. The inner end of each arm is provided with an offset finger 38, the end of which engages in a circular groove 39 in the shank, the fingers being curved at their inner ends as shown by dotted lines at 40 to conform to the curvature of the groove.

When the tool is in a position of non-use it will be apparent that spring 22 will urge pin 16 upwardly to its limit, as defined by groove 24 and screw 25. Also, spring 35 will draw pins 31, 32 toward each other until limited by pin 33 abutting the upper end of slot 34. To apply the tool to the ring gear the entire tool is merely forced radially into the teeth, pin 16 dropping between teeth and jaws 37 engaging between other teeth spaced about the periphery. It is to be observed that since pin 16 may assume different positions outwardly from the upper end of shank 11 and the jaws 37 vary their positions outwardly from the axis of shank 11, these jaws and pin 16 will properly engage teeth of ring gears of varying diameter and tooth pitch. When engaged on the ring gear the tool will remain thereon. If it be desired to rotate the flywheel by moving handle 12 in the direction of arrow 41, pin 16 forms a fulcrum point and jaw 37 on arm 14a forms the point of application of force to produce turning of the flywheel. Similarly, if the tool be moved in the direction of arrow 42, pin 16 is still the fulcrum point but force is applied to jaw 37 on the end of arm 14. Flanges 21, 21a that are formed on member 15 aid in preventing slipping of the tool laterally of the ring gear, these flanges forming abutments which engage opposite side faces of the ring gear teeth.

When it is desired to remove the tool it is merely moved radially from the flywheel which automatically withdraws jaws 37 and pin 16.

When it is desired to fold arms 14, 14a to the position shown in Figure 2, they are merely grasped by the two hands and forced downwardly. As shown in Figure 6, the fulcrum of the ends of fingers 38 engaging in groove 39 moves links 28a, 29a (and corresponding links 28, 29) outwardly from the shank to a position as shown in Figure 6a where the fingers move out of groove 39. They are then folded downwardly, intermediate portions thereof nesting between the juncture of the upper and lower links and resting on pins 31, 32, as shown in Figure 2. When the fingers are to be again disposed in operative relation in groove 39, they are first moved to the position shown in Figure 6a. By resisting movement of the shank and applying a downward force to the arms, thus

moving pins 36, 37 downwardly, the upper links are spread apart permitting the ends of the fingers to again be positioned in groove 39.

While only a single embodiment is illustrated, it will become apparent that many modifications are possible within the spirit of the invention. For example, the shank and handle may be made integral and, if desired, the shank may be formed of square or rectangular stock. The size may also be varied to fit ring gears of any diameter, and if desired this may be attained by merely replacing arms 14, 14a by longer or shorter arms the shape of which is merely modified to properly engage the particular ring gear. Spring 35, while expeditiously disposed in the position illustrated may be otherwise disposed to force the upper ends of the upper links inwardly and upwardly. Many other modifications will become apparent within the purview of the invention, and hence the particular illustration is to be regarded as exemplary only and the invention not limited thereto except as defined by the scope of the appended claims.

Having described the invention, what I claim as new is:

1. A device for rotating flywheels of the type having a ring gear thereon, comprising; an elongated shank having a handle at one end and an abutment member at the other end adapted to be disposed between teeth of the gear, said abutment member being mounted to said shank for axial adjustment relative thereto and being resiliently urged outwardly away from said shank, a linkage system having pivot means disposed adjacent said other end of the shank constrained to move to various distances from the axis of the shank at opposite sides thereof and in the same perpendicular planes to said axis, resilient means connected between portions of the pivot means and urging said pivot means toward a position where the pivot means are closest to said shank, and a pair of oppositely extending arms having tooth engaging jaws at their outer ends, each arm being pivoted near its inner end to one of said pivot means.

2. A device in accordance with claim 1 including means for moving said jaws to the same relative positions laterally of the shank axis when said pivot means move in their path of movement.

3. A device in accordance with claim 2 including means for detachable connecting the arms with the moving means to permit folding of said arms to positions adjacent said shank.

4. A device for rotating flywheels of the type having a ring gear thereon, comprising; an elongated shank having a handle at its lower end and an abutment member at its upper end adapted to be disposed between teeth of the gear, said abutment member being mounted to said shank for axial adjustment relative thereto and being resiliently urged upwardly away from said shank, a first set of identical links comprising two pairs, the links of each pair being disposed on opposite sides of the shank and extending laterally thereto in opposite directions at the same angle to the shank axis, a single pivot securing the lower end of each link of the set to the shank, a second set of substantially identical links comprising two pairs, the link of each pair being disposed on opposite sides of the shank and crossing same so that the upper and lower ends of the pairs lie on opposite sides of the shank, pivot means connecting the outer free ends of each pair of the first set of links with the lower ends of a pair of the second set of links, pivot means connecting the two pairs of the second set of links at a point where they

5

cross the shank, said pivot means being movable axially of the shank, resilient means connected into the linkage and urging the last named pivot means upwardly, a pair of arms having tooth engaging jaws at the outer ends thereof, pivot means securing each arm near its inner end to the upper ends of a pair of the second set of links, a groove in said shank adjacent its upper end, said groove lying substantially in a plane perpendicular to the shank axis, and a finger on the inner end of each arm engaging in the groove.

5. A device in accordance with claim 4 wherein said abutment member is provided with flanges engageable with opposite side faces of the teeth of the gear to prevent lateral movement of the tool when disposed on the gear.

6. A device in accordance with claim 4 wherein said pivot means connecting the two pairs of the second set of links at a point where they cross the shank has sufficient axial movement to permit the fingers on the arms to disengage from said groove, whereby the arms may be folded downwardly to a position at opposite sides of the shank.

7. A device in accordance with claim 4 wherein said resilient means is a tension spring extending through the shank having its ends connected to the pivot means connecting the outer free ends of each pair of the first set of links with the lower ends of the second set of links.

8. A device for rotating flywheels of the type having a ring gear thereon, comprising; an elongated shank having a handle at its lower end and an abutment member at its upper end adapted to be disposed between teeth of the gear, said abutment member being mounted to said shank for axial adjustment relative thereto and being resiliently urged upwardly away from said shank, pivot means disposed adjacent the upper end of the shank constrained to move to various distances from the outer free end of the abutment member at opposite sides thereof and in the same perpendicular planes to the longitudinal axis of the shank, resilient means connected between portions of the pivot means and urging said pivot means upwardly, a pair of upwardly and outwardly ranging arms disposed on opposite sides of said shank having tooth engaging jaws at their outer ends, each arm being pivoted near its inner end to one of said pivot means, and means effecting a pivotal connection between the inner ends of the arms and the shank.

9. A device for rotating flywheels of the type having a ring gear thereon, comprising; an elongated member having a handle at the lower end

6

thereof, an abutment device adjacent the upper end thereof adapted to engage teeth of the gear, pivot means disposed adjacent the upper end of the member, means operatively connecting said pivot means to the member for constraining movement of the pivot means to various distances from the outer free end of the abutment member at opposite sides thereof and in the same perpendicular planes to the longitudinal axis of the member, a pair of arms disposed on opposite sides of said member extending in opposite directions upwardly and outwardly from the pivot means and having tooth engaging jaws at their outer ends, each arm being pivoted near its inner end to one of said pivot means, and resilient means connected between portions of the pivot means for moving said pivot means in a direction to resiliently urge said jaws toward each other.

10. A device in accordance with claim 9 wherein said means for constraining movement of the pivot means comprises; a first pair of links pivotally connected at their inner ends to the shank, and extending outwardly therefrom, a second pair of links pivotally connected to the said member between the ends thereof, for movement about a common pivotal axis, the lower end of each of the links of the second pair being pivotally connected to the outer end of one of the links of the first pair.

11. A device in accordance with claim 10 including a slot extending longitudinally of said member between the ends thereof to slidably receive the pivotal connection between the second pair of links and said member.

12. A device in accordance with claim 9 wherein at least a portion of said resilient means is disposed within said member.

JOHN A. RIORDAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,667,170	Segal	Apr. 24, 1928
1,727,245	Miller	Sept. 3, 1929
2,259,922	Bohlander	Oct. 21, 1941

FOREIGN PATENTS

Number	Country	Date
98,696	Germany	Jan. 30, 1898
24,903	Sweden	June 13, 1908
89,398	Switzerland	May 16, 1921